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SAFETY ENGINEERING

PREVENTION OF NEEDLESS WASTE BY FIRES AND ACCIDENTS

VOLUME XXX

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SAFETY ENGINEERING

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Current Comment and News

THE Fourth Annual Safety Congress of the National Safety Council, to be held in Philadelphia in October, promises to be a big affair. An attendance of 2,500 to 3,000 is expected. The preliminary program, in this number of SAFETY ENGINEERING, shows that every phase of safety work is to be discussed by the foremost safety men of the country.

In line with plans laid out by the "Safety First" Federation of America for safer street traffic in the principal cities of the country, the Transportation Committee of the Federation held its first meeting in the Craftsman's Building, New York, on July 13. The committee is composed of "Safety First" advocates from different States. Each spoke of the methods adopted in his city and offered suggestions for the betterment of existing conditions. The result of the meeting was the appointment of sub-committees to draft measures to be presented for adoption at the coming national convention of the Federation in Detroit in October. When the movement is fully organized it is to be under the direction of William R. Wilcox, formerly chairman of the Public Service Commission of New York.

The skyscrapers of New York are to be placed under the scrutiny of the Board of Health officials with a view to ascertaining, it is said, whether sanitary rules are adhered to strictly. The truth is, that most, if not all, of these structures, were reared under the direction of numerous city departments, whose officiousness has often been more marked than their beneficent service. The new departure will place the officials on trial, as well as the owners and tenants of the skyscrapers. If there is anything about the buildings that militates against the healthfulness of their occupants, it is the fault, to some extent, of the various civic bodies that have assumed to dictate how they were to be constructed. If some of the older buildings have been deprived of the light and air that they once enjoyed, that is the fault of the building department and the law. Ancient easements of light and air were abolished long ago.

Fire inspectors in Birmingham, Ala., have been notified that where hazardous fire conditions are found in the future the occupant or owner of the premises is to be placed under arrest. There has been an effort made during the past few months to induce citizens to give more attention to the matter of fire prevention, but the movement has met with utter disregard, notwithstanding many instances have been reported by the inspectors where the violations of fire risks have been of a flagrant nature. It is expected that the new rule will arouse the citizens to exercise more care and vigilance along fire prevention lines. The Birmingham fire record is bad enough to justify the most extreme measures.

On the night of July 7, a tornado swept over Ohio, Kentucky, Indiana and Illinois, doing damage approximating $2,000,000 and causing the deaths of more than two score persons. Church steeples were blown down, hundreds of buildings leveled to the ground, vessels wrecked, trees uprooted and general devastation caused. A train carrying a stable of valuable race horses was wrecked, killing 14 of the animals, valued at more than $100,000. One incident of the windstorm was the carrying

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of an automobile 300 feet and depositing it on the ruins of a building on a prominent corner in the city of Cincinnati.

Courtesy New York Tribune.

An ordinance has gone into effect in Richmond, Va., which holds the drivers of fire apparatus and all other chauffeurs personally responsible for injuries to individuals or property caused by negligence in failing to observe the traffic regulations, or through reckless driving. As a general rule, there are few careless drivers of fire department vehicles in any of the larger cities. The risks to which they must expose themselves and their comrades are so manifold that a reckless driver is discovered speedily and removed summarily. This, however, cannot be said in behalf of chauffeurs generally, hence, while the Richmond ordinance is exactly what is needed to curb the chauffeurs of pleasure cars and the lighter commercial electric vehicles, it seems unfair to apply it to the driver of fire apparatus. If carried out, unquestionably there will soon be a noticeable increase in fire losses, owing to the greater deliberation, resulting in less speed in getting to fires. In most cities fire apparatus has the undisputed right of way, when responding to an alarm, and all other vehicles are required to come to a standstill immediately, when the department apparatus is approaching. It is a safe prediction that, if the drivers of fire apparatus realize that they face a possible damage suit every time they speed to a fire, many of them will carry carefulness to an extent that will prove materially expensive. The action of the city of Richmond grew out of several small claims which the city had to pay.

The report on the structural conditions and hazards in Easton, Pa., says the State law relative to building construction lacks enforcement and the municipal law is inadequate. Combustible roof coverings are prohibited throughout the city, but the structural conditions are weak. The laws relating to explosives and inflammables are inadequate, and while local conditions are fair, they are liable to become hazardous owing to a lack of proper regulations. The National Electric Code has been adopted by ordinance. Overhead wires create serious trouble in mercantile districts and elsewhere, although many of them have been removed. Concerning the conflagration hazard, the report says that in the principal mercantile district severe group fires are probable and could spread across the narrow streets and alleys, but no sweeping fire could occur. Only individual or group fires are probable in the minor mercantile or manufacturing districts. In the residential districts incombustible roofs prevail and the general hazard is slight. The fire department is considered efficient, but it is undermanned, and, as in many other cities, it lacks engine capacity.

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Photo. Underwood & Underwood. New York.

HOW THE TORNADO HIT CINCINNATI.

A heavy automobile carried 300 feet and deposited on the ruins of a building, on a prominent corner in Cincinnati.

While carelessness and thoughtlessness are the chief causes of accidents, we may be ever so careful and still meet an accident, due to the carelessness of others. A safety revival is needed not only industrially but publicly as well, said *American Industries*. The lack of personal caution is largely due to lack of training during early childhood. The habits of safety should be inculcated in the minds of children not only in the home, but in the school as well. They should be taught the dangers of playing in the streets and on railroad property, since these practices annually result in thousands of killed and injured. Several States have already passed acts requiring that schools allot a certain amount of time each week for the purpose of teaching public safety. The whole accident prevention problem evolves itself into an educational movement in arousing a wholesome respect for accidents and their consequences.

Two considerations determine the practicability of the sprinkler service: the protection of property and business and the reduction of insurance cost. It is demonstrated that from 75 to 95 per cent of insurance can be saved and fully as much of the probability of fire loss

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obviated by the sprinkler equipment, said the *Real Estate Magazine*. The cost of the sprinkler system both for installation and maintenance, varies according to the simplicity or elaborateness of the equipment. The inside equipment will cost from $2.50 to $4 per sprinkler head, while the cost of the outside connections and valves can be determined by the length of the mains and the number of valves required. A sprinkler head is required for each sixty-four square feet of ceiling or roof surface. A one-source equipment will cost something like seven cents per square foot of ceiling or roof surface, and a two-source equipment, including gravity tanks, will cost about ten cents per square foot of roof and floor space. The cost of maintenance of a single equipment is very small. The cost of preventing water from freezing in elevated tanks in cold climates is probably the greatest item of maintenance expense. One hundred managers of plants in which the system is used estimate the maintenance expense at 5 per cent.

The report of the inspectors of the National Board of Fire Underwriters on the structural conditions and hazards in Allentown, Pa., says that the State laws relative to building construction are of some value, but are not enforced properly; municipal laws lack important features. The fire limits include the entire city, but frame construction is permitted; wooden shingle roofs are prohibited. The laws relative to explosives and inflammables are inadequate. The control is with the State fire marshal, the department of public safety and the fire chief, whose occasional inspections are ineffective. Local conditions are fair, but rubbish is allowed to accumulate and hazardous conditions exist at hardware, paint and grocery stores. The National Electrical Code has been adopted by ordinance, under which new work is inspected by the underwriters' inspector. Overhead wires in the principal mercantile district and elsewhere create serious obstructions. Concerning the conflagration hazard, the report says that in the principal mercantile district severe individual and group fires are possible at many points and the probability of fires spreading across the narrow streets and involving a large part of the district is high. However, a conflagration should not involve the entire district. Severe individual and group fires are probable in the minor mercantile and manufacturing districts. In the residential districts brick buildings, with incombustible roofs, prevail, and the general hazard is slight.

NATIONAL SAFETY MOVEMENT.

While poor housing, exposure, alcoholism, use of common drinking cups and overwork, all tend to lessen the power of the miner to resist disease, the prime factor in causing pulmonary trouble is the rock dust in the mines.—*Dr. A. J. Lanza.*

The safety movement on the New Haven is here to stay. We must not rest until our road is the safest one in the country on which to travel, and serves the public with the highest efficiency and economy. We must breathe safety, talk safety, feel safety, dream safety, and feel that not even unconsciously must we commit an act that will injure one of us.—*Howard Elliott.*

It is possible to make the man on the job think, as it is possible for a manager to transfer energy to each man, if he knows how to reach the man.—*B. M. Moseley.*

It is my opinion that statistics are as essential in accident prevention as in any other endeavor.—*E. J. Russert.*

The precise qualities that fit a metal for use as a protective covering are ductility, tenacity, high conducting power and high power of radiation, a high fusion point and incombustibility up to a fairly high temperature.—*Charles E. Worthington.*

The guarding of lathes in a plant typifies often the degree of the guarding of all other machine tools in the plant.—*F. W. Bail.*

Let people know the full danger of fire chargeable annually to carelessness through the thoughtless handling of matches, the storage and handling of gasoline, oil, fire works and explosives.—*J. William Morgan.*

Caution produces an efficiency that acts as a safeguard for life and property.—*Ernest S. Reed.*

It is now conceded generally, I believe, that the safety device has not entirely fulfilled its mission in the industrial world.—*J. C. Robinson.*

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ANNUAL FIRE WASTE IN THE UNITED STATES
"The buildings consumed, if placed on lots of 65 ft. frontage, would line both sides of a street extending from New York to Chicago. A person journeying along this street of desolation would pass in every thousand feet a ruin from which an injured person was taken. At every three-quarters of a mile in this journey he would encounter the charred remains of a human being who had been burned to death."
From page 18, Government Report entitled "The Fire Tax and Waste of Structural Materials in the United States," Bulletin 418, Department of the Interior, U.S. Geological Survey

A Fire Department That Fights Fires Before They Happen

FIRE prevention receives special attention in the annual report of the New York Fire Department. The section of the report allotted to this subject is illustrated profusely. There is a drawing done by one of the engineering-inspectors of the Fire Prevention Bureau which illustrates every phase of fire-retarding construction, showing the exterior and the interior of a building, sprinkler and standpipe systems, different forms of fire doors, fire escapes and all sorts of fire prevention appliances.

Photographs are given of various fire hazards, such as dangerous cellar conditions, bad factory housekeeping, fire hazards in the home, children playing with matches, etc.

The annual fire waste of the United States is illustrated by a photograph of a model which the fire department built and which is now being shown at the Panama-Pacific Exposition. This model is 9 feet long by four feet high and represents a double line of buildings stretching from New York to Chicago across the States of New Jersey, Pennsylvania, Ohio and Indiana. In the model all these buildings are shown (by means of illuminated tinsel) to be on fire, and the conflagration is described as follows:

The buildings consumed, if placed on lots of 65-foot frontage, would line both sides of a street extending from New York to Chicago. A person journeying along this street of desolation would pass in every 1,000 feet a ruin from which an injured person was taken. At every three-quarters of a mile in this journey he would encounter the charred remains of a human being who had been burned to death.—From the Government report entitled, "The Fire Tax and Waste of Structural Materials in the United States," Bulletin 418, Department of the Interior, United States Geological Survey.

Another page of photographs shows chemical explosions in New York City during the year 1914.

Fire Commissioner Adamson's recent report on how public schools are protected by the Fire Prevention Bureau is illustrated with numerous photographs of the dangers in public schools:

ANALYZING BLACK HAND BOMBS.

It will be news to many New Yorkers that the Fire Prevention Bureau has the unpleasant privilege of examining all the deadly bombs found in New York. Last year the bureau, through its Division of Combustibles, inspected and analyzed 141 Black Hand bombs. Commissioner Adamson's report says of bomb planting:

Bombs have been placed about the city in-

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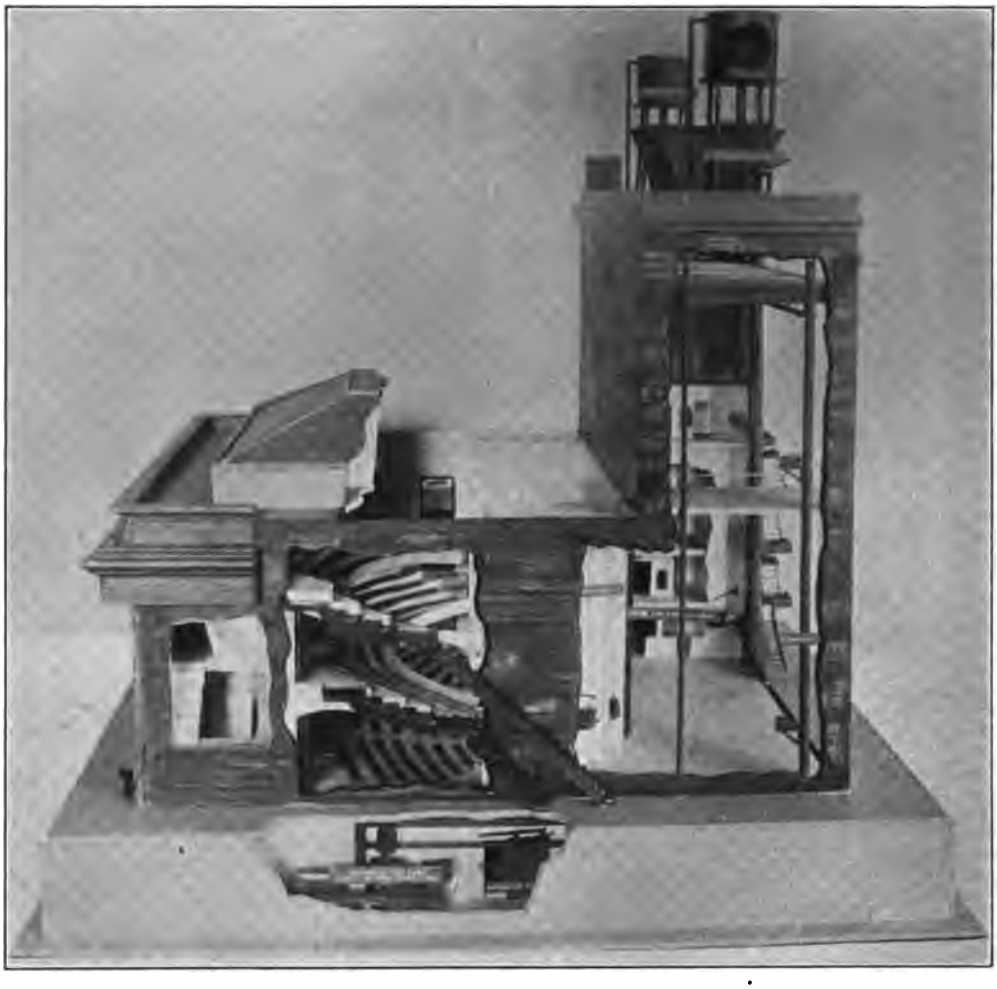

"Model Theater," showing fire prevention methods for protecting audiences from fire dangers. It was built by the New York Fire Department to illustrate how applied fire prevention protects theater audiences from fire. The model is now at the Panama-Pacific Exposition.

discriminately—in churches, stores, tenement houses, banks, private residences and even in the Tombs Police Court. The most serious explosion during 1914 was that of the morning of July 4, at One Hundred and Third street and Lexington avenue, Manhattan. Four persons lost their lives. The explosion took place in a tenement house in the apartment of Arthur Caron, one of the victims. This explosion resulted in the total wrecking of the building. The disaster occurred about 11 o'clock in the morning. Had it happened at night, when the place was fully occupied, the loss of life would have been enormous.

Revelations concerning blackhanders and bomb-makers in this city were made during the trial in General Sessions before Judge Rosalsky, in January, 1914, of Angelo Sylvestro. Judge Rosalsky, it will be remembered, received a deadly bomb sent by a man by the name of Herman Klotz, who lost his life on March 21, 1914, at his own home, 1332 Fulton avenue, Bronx, in an explosion resulting from a bomb of his own making.

Two material witnesses in a certain case were Alfred Lehman, alias "Schmitty," and Rocko Pucciarello, alias "Zump." Lehman testified that he had planted bombs in 33 instances, and had been implicated in killing two men. When asked by Assistant District Attorney Manley if he had no regard for life when he set off dynamite bombs in crowded tenements, he coolly answered:

"No. I did not—no more than I would have had for insects I wanted to kill."

This man testified to having set off bombs at a number of places.

All bombs found by the police or other persons in the city, are reported to the fire department, and an inspector from the Bureau

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DON'T PUT ASHES IN WOODEN BOXES
DON'T HAVE GAS BRACKETS NEAR WINDOW CURTAINS
DON'T HAVE LIGHTED CANDLES ON CHRISTMAS TREES
FIRE
DON'T LET CHILDREN PLAY WITH MATCHES

Fire Prevention "Don'ts" Illustrated.

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of Combustibles is assigned to make analysis of, and report upon, all such objects. The examination of these bombs is often attended with danger.

USE AND STORAGE OF HIGH EXPLOSIVES.

Another little known but important activity of the Fire Prevention Bureau is the problem of safeguarding the use of explosives throughout the city. Increased quantities of dynamite are now being used in various construction works, subways, etc. Difficulties have beset the fire commissioner in this matter and increased responsibility attached to the department in seeing to it that the explosives are not only handled properly but that they are stored in safe places. The fire department report says in reference to this subject:

In the aqueduct tunnel the various operating shafts were located with seemingly no consideration to the question of just how the large quantity of dynamite necessary to be used daily at each shaft could be best protected from accidental explosion, or to the equally important question of designating so far as engineering conditions would permit, the location of the shafts themselves where such accidental explosion would work the least havoc to human life.

When the fire commissioner came to issue permits and instructions regarding the handling and safeguarding of dynamite along the line of construction, he found one shaft located across the street and nearly opposite a hospital, and that 400 pounds of dynamite daily would be used practically from the beginning. It is hardly possible that any engineering condition would have prevented a shaft in this vicinity being located fairly distant from this hospital. It is fair to say that the Board of Water Supply later agreed to and did fix the amount of dynamite which should be delivered daily at each shaft, and from that time forward the board and the fire commissioner worked in entire harmony to minimize the danger of accidental explosions; but it was then too late to modify the original location of the shafts themselves.

The fire commissioner was not consulted regarding the location of shafts on the subway work. It is perhaps not stating it too strongly to say that in locating the working shafts of the subway, the number and location of magazines, and the delivery and care of necessary explosives should not only have been coincidentally considered, but considered in conference with the officer charged by law with the responsibility of seeing that such explosives are used with the least possible hazard, to wit, the fire commissioner. But this was not done. As a result, the problem of safeguarding the storage and handling of dynamite on the subway work is rendered more difficult.

Chief Hammitt describes in detail the operations of the Fire Prevention Bureau. He shows that the Fire Prevention Bureau has jurisdiction in 275,533 buildings. More than 49,000 of these buildings in Greater New York are hotels, theatres, factories, schools, warehouses, lofts, etc., while 225,918 are one and two-family houses.

Chief Hammitt points out the progress in fire prevention work over the previous year, stating that there was an increase of more than 29 per cent. of orders issued, and an incease of more than 58 per cent. of orders complied with during the year.

The number of orders issued by the Fire Prevention Bureau last year was 25,653; the number of orders complied with 18,010.

"OLD LAW" TENEMENTS.

A section of Chief Hammitt's report is devoted to tenement house fires and lodging house conditions. He shows that most of the loss of life in tenement house fires occurs in "old law" tenements. He regards "old law" tenements as a serious hazard and says that there are 78,371 of them in Greater New York. These "old law" tenements represent more than 20 per cent. of the total buildings in the city. There were 12,011 fires in buildings in Greater New York during 1914, and out of this number 6,781 occurred in tenements, most of them of the "old law" type.

Chief Hammitt gives a number of instances of tenement house fires and in each case some form of gross carelessness was the cause of the fire. In one case, where two women were burned to death, the cause was "lighted match or cigarette carelessly thrown away." In another, where a woman lost her life, the cause is given as "throwing match among pile of newspapers." In a third fatal case, "carelessness with matches" is also the cause.

Chief Hammitt shows that every lodging house has been inspected and orders have been issued and mostly complied with, remedying serious fire hazards in these places.

The 1,151 theatres and moving picture houses and the 891 dance halls have also

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FIRE PREVENTION

FIRE-RETARDING CONSTRUCTION AND FIRE PREVENTION DEVICES.

This design shows fire-retardant building construction of reinforced concrete and skeleton steel. Exterior bearing walls increase in thickness from top down, top extending 3 ft. above roof. Windows in exterior walls of hollow metal frames, sashes glazed with wire glass and made automatic.

Sprinkler System throughout, supplied either by gravity tank on roof, or by steam pump in cellar, both discharging into riser on left-hand side of design. Branch lines from risers on each floor send out sub-branches, which diminish in size as number of sprinkler heads become less. On right-hand side is stand-pipe equipment, with hose outlets on each floor. System has two supplies—tank on roof and pump in cellar, filled by connection with street main; supply controlled by float valve.

In upper left-hand panel is a "Philadelphia Tower," entered from outside through swinging fire-door. In panel below, an interior fire-alarm box, extinguisher, and water cask with pails. In upper right-hand panel are storage batteries for interior alarm; also automatic fire-door. In next panel are fire pails, etc. In cellar, besides pump, is a motor, properly enclosed.

Certain liberties have had to be taken with the drawing to include all features described.

Designed by HAROLD K. HUGHES. Engineer Inspector, Fire Dept., New York City.

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received careful attention from the Fire Prevention Bureau.

DON'TS AND WARNINGS.

Attention is drawn in the report to the large amount of literature in the form of "Don'ts and Warnings for Fire Prevention" distributed during last year. Upwards of 100,000 copies of the "Don'ts" were circulated through various associations, public schools and civic societies.

The educational campaign last year consisted of teaching of fire prevention lessons in the schools, observance of Fire Prevention Day by a departmental parade of apparatus and the distribution of signs throughout the city reading, "This is Fire Prevention Day, Clean Up Rubbish," the giving of lectures, exhibitions of motion picture films, and the enlistment of the co-operation of various merchants, department stores, railway companies, and exhibitions of fire prevention work.

THEATER FIRES IN 1915

Reports to SAFETY ENGINEERING show about 100 fires in theaters and amusement resorts in the United States during the first six months of the current year. New York had but two theater fires in that period, causing comparatively slight damage in each case. This attests the accuracy of the claim made by Fire Commissioner Adamson in his annual report that "The New York theater today is one of the safest buildings in the world so far as protection from fire is concerned."

Jan. 1. Newton, Ky. Kuepper Opera block.
Jan. 3. Cohoes, N. Y. Empire Theater. Started on stage.
Jan. 3. Clarksville, Tenn. Clarksville Theater.
Jan. 4. Arkadalphia, Ark. Motion picture.
Jan. 4. Longview, Tex. Opera house and Masonic Temple.
Jan. 6. Washington, Pa. Two theaters and others.
Jan. 7. Lapeer, Mich. Opera house block and others.
Jan. 7. Charlottesville, Va. Jefferson Theater.
Jan. 9. Boone, Ia. Arie showhouse. Started in boiler room.
Jan. 11. Whitehall, Mich. Coliseum. Started from furnace.
Jan. 11. New Haven, Conn. Music hall.
Jan. 15. Winamac, Ind. Vurpilatt Opera House. Overheated stove.
Jan. 17. Camden, Ark. Passtime Amusement Hall.
Jan. 18. Brunswick, Md. Kamberger Opera House.
Jan. 22. Baltimore, Md. Victoria Motion Picture. Started in operating room.
Jan. 22. Kenora, Ont. Hillyard Opera House.
Jan. 26. Cleveland, Ohio. Avenue Theater.
Jan. 27. Belleville, Ont. Palace Theater.
Jan. 28. Rochester, N. Y. Victoria Theater. Caught on stage.
Jan. 29. Iola, Kan. Iola Opera House.
Jan. 31. Boston, Mass. Toy Theater.
Feb. 3. Plainfield, Wis. Gens Theater.
Feb. 4. Colon, Canal Zone. Garden Theater.
Feb. 10. Gadsden, Ala. Belle Theater.
Feb. 10. Platte, S. D. Opera House. Loss $30,000.
Feb. 12. Providence, R. I. Casino. Explosion. Loss $60,000.
Feb. 14. Wetmore, Kan. Opera House.
Feb. 16. Wolcott, N. Y. Opera House.
Feb. 17. Redfield, S. D. Lyric Theater.
Feb. 23. Terrell, Tex. National Theater. Motion picture.
Feb. 23. Grand Marais, Mich. O'Brien Opera House.
Feb. 24. Pine Bluff, Ark. Oak Theater. Motion picture.
Feb. 26. Lewisville, Tex. Dixie Theater. Motion picture.
Mar. 3. Duluth, Minn. Empress Theater. Started in paint room.
Mar. 3. Brownwood, Tex. Queen Theater.
Mar. 4. Brentford, Ont. Gem Theater.
Mar. 5. Altoona, Pa. Motion picture. Overheated spark plug fell on film.
Mar. 11. Worcester, Mass. Lincoln.
Mar. 13. North Attleboro, Mass. Starkey's Theater.
Mar. 17. Haverhill, Mass. Majestic Theater.
Mar. 18. Oneonta, N. Y. Motion picture.
Mar. 18. Meyerdale, Pa. Donges Theater.
Mar. 18. Cleveland, Ohio. Almo Motion Picture.
Mar. 19. Trenton, N. J. Grand Theater. Started in boiler room.
Mar. 22. Montreal, Que. Varieties Theater. Motion picture. Ignition of films in operator's booth.
Mar. 22. Littleton, N. H. Tilton Opera House. Kerosene explosion.
Mar. 22. Frederick, Md. Marvel Theater. Explosion.
Mar. 23. Hazelton, Pa. Lyric Theater.
Mar. 26. Ennis, Tex. Jewell Theater. Motion picture. Ignition of film.
Mar. 27. Richmond, Va. Rex Theater.
Mar. 28. Denison, Tex. Aladin Theater. Motion picture.
Mar. 28. Lyons, Ill. Cream City Amusement Park.
Mar. 29. Sioux Falls, S. D. Majestic Theater. Loss $35,000.

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Mar. 29. Trenton, N. J. Bijou Theater. Motion picture.
Mar. 29. Glen Campbell, Pa. Theater.
Mar. 29. Swedesboro, N. J. Lyric Theater.
Apr. 1. Bemidji, Minn. Brinkman Theater.
Apr. 3. Sterling, Ill. Motion picture.
Apr. 5. Mt. Oliver, Pa. Colliseum Theater. Motion picture. Started in operator's booth.
Apr. 7. Brockton, Mass. Empire Theater.
Apr. 8. Yoncalla, Ore. Opera House.
Apr. 13. Bay St. Louis, La. Motion picture.
Apr. 14. Baton Rouge, La. Motion picture.
Apr. 16. Buffalo, N. Y. Edisonia Theater.
Apr. 21. Buffalo, N. Y. Arcadia Theater. Motion picture.
Apr. 22. Holyoke, Mass. Empire Theater. Motion picture. Started in rear of stage. Loss $50,000.
Apr. 22. Olive Hill, Ky. Lyric Theater.
Apr. 25. New Haven, Conn. Grand Opera House. Motion picture.
Apr. 28. Kokomo, Ind., Ideal Theater.
Apr. 28. Sioux City, Ia. Scenic Theater. Motion picture.
May 2. Sullivan, Ind. Majestic Theater. Motion picture.
May 2. Abilene, Tex. Royal Theater. Started in electric piano.
May 3. Ironton, Ohio. Opera House.
May 3. Detroit, Mich. People's Theater. Boys with matches.
May 4. West Frankfort, Ill. Grand Theater.
May 4. Louisville, Ky. Columbia Theater.
May 4. Union City, Tenn. Gem Theater. Motion picture.
May 6. Oneonta, Ala. Motion picture.
May 7. Toronto, Ont. Princess Theater. Loss $120,000.
May 8. Whitesboro, Tex. Gem Theater.
May 11. Larego, Tex. Dixie Theater. Motion picture.
May 11. Corsicana, Tex. Gem Theater.
May 11. Camden, N. J. Broadway Theater.
May 14. Little Rock, Ark. Crescent Theater. Explosion of film.
May 16. Spooner, Wis. Dreamland Theater.
May 18. Kapowsin, Wash. Motion picfure
May 22. Norfolk, Va. Majestic Theater.
May 26. Memphis, Tenn. Lyric Theater.
May 29. Pana, Ill. Panama Opera House. Loss $40,000.
May 31. Williamsport, Pa. Lycoming Opera House.
June 2. Evansville, Ind. Colonial Theater.
June 3. Chatham, Ont. Classic Theater.
June 3. Peoria, Ill. Star Theater. Motion picture. Defec. elec. wiring.
June 4. Diamond Park, Pa. Grand Stand. Cigarette.
June 6. Hudson, N. H. Pinehurst Park.
June 9. Madison, Ga. Hayes Motion Picture Theater.
June 14. Kensett, Ark. Hicks Theater. Motion picture.
June 17. Monroeville, Ind. Motion picture theater.
June 19. Truckee, Cal. Ice Palace and theater.
June 21. Turlock, Cal. Wonderland Theater.
June 25. Mystic, Conn. Lyceum Theater.
June 26. Delaware Water Gap, Pa. Casino. Incendiary. Loss $21,000.
June 26. Victoria, Tex. Electra Theater.
June 30. New York, N. Y. Manhattan Casino.

PARAPET WALLS AND WIND.

Unless braced parapet walls are liable to be blown over when subjected to the pressure of high winds. The parapet wall of a Philadelphia mill, which extended seven feet above the ridge of the roof, was blown over recently, causing a property loss of several hundred dollars.

IGNORANCE RESPONSIBLE.

As a nation we have no conception of the enormous loss yearly through fire. Until we do know, we have no means of correcting existing conditions. Ignorance will stand until it is dissipated through the light of intelligent teaching.—*H. L. Simpson.*

SAFETY FIRST IN ELEVATORS

OPERATORS—BEFORE STARTING THE CAR
BE SURE THAT
1. Car is not overcrowded.
2. Doors are shut and latched.
3. Passengers are well back from door.
4. Passengers are away from operating levers.

PASSENGERS—FOR YOUR OWN SAFETY
ALWAYS
1. Wait until car stops before getting on or off.
2. Upon entering car, move back and face door.
3. Watch threshold when entering or leaving car.
4. Call your floor, but **DO NOT** talk to operator.

Approved by NEW YORK BUILDING MANAGERS ASSOCIATION

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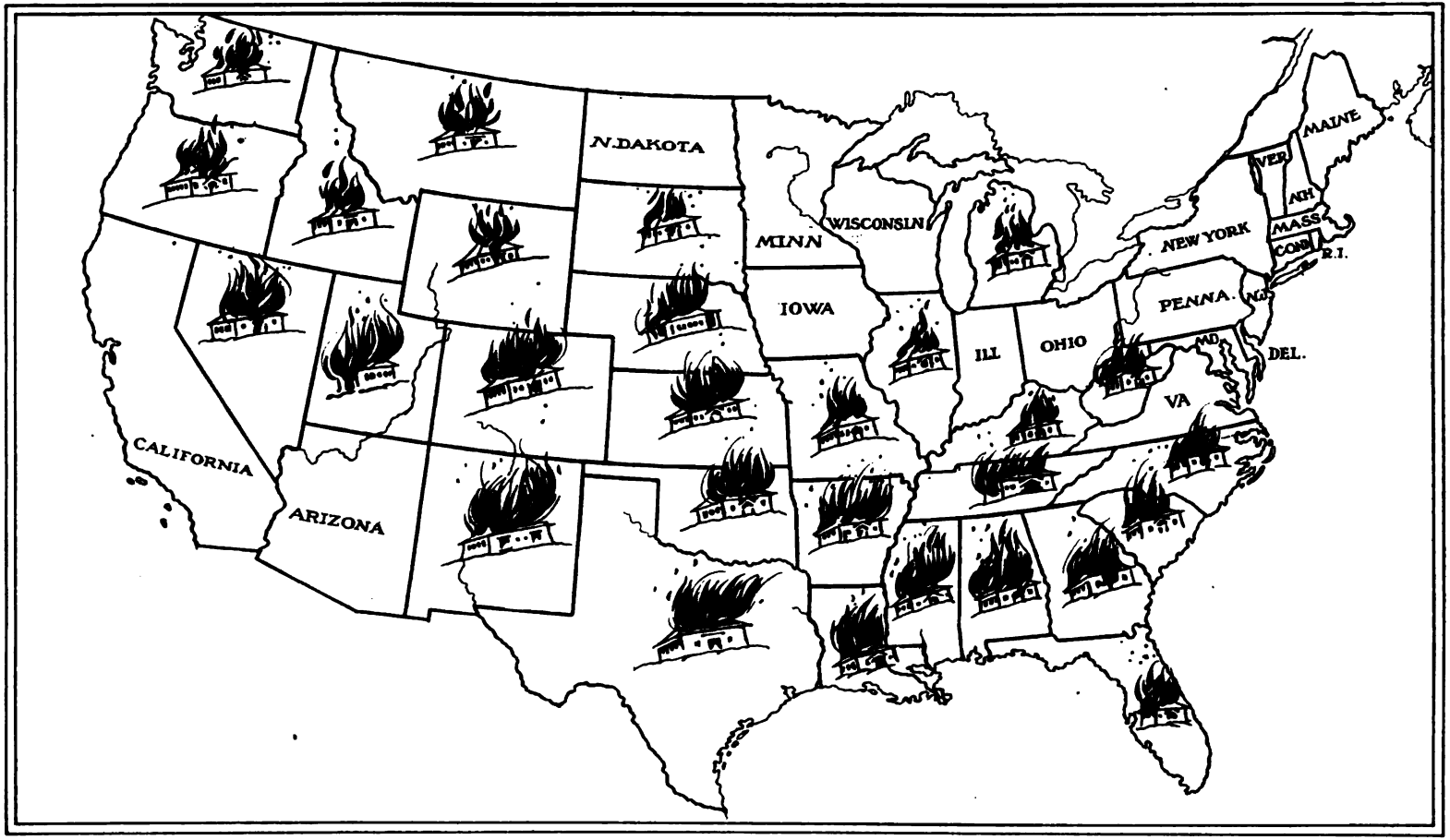
STATES AFIRE HAVE NO LAWS SAFEGUARDING SCHOOL BVILDINGS·



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Status of Schoolhouse Construction In the United States

By Frank Irving Cooper, Consulting Architect, Boston. An Address Before the National Fire Protection Association

STATISTICS published in SAFETY ENGINEERING show that a building used in connection with school purposes burns up every 24 hours.

Tomorrow it may be the building to which your child goes to school.

These school buildings would not burn if properly constructed, and if properly planned the children could escape if a fire did occur.

The National Board of Education says it can do nothing, as every State must enact its own regulations. It is a matter of State rights in which the National government has no right to trespass.

Many of the States have passed regulations to better the construction of schoolhouses, but the United States consists of 48 States divided into 48 different opinions as to what should be done.

On only one point does there seem to be an agreement, and that is that doors should open out, but only one-half of the States consider it necessary to pass a regulation to this effect.

You, the members of the National Fire Protective Association, have an important duty to perform. You are not divided into 48 warring parts. You can press for right regulation in every State in the Union.

That this action is needed is shown by the care free attitude of legislators. So little do they heed the lessons of history that they continue to force children by law to daily enter school buildings so planned and built that the first spark would turn them into a Collinwood shambles were it not for the wonderful quickness and skill of our fire departments, and the cool-headedness and devotion of the young women who form the great body of the teaching forces in the public schools.

There is another vital point about regulations, and that is the enforcement.

Regulations which are unaccompanied by heavy penalties are seldom fulfilled. I have in mind a flagrant case. The regulation called for floors in corridors to be of fireproof construction. The corridor in this case extended from end to end of the school building; the two ends forming over one-half the corridor were used as wardrobes in which hung the children's clothes, the only separation from the central portion was by wire screens seven feet high.

The floor of the central portion was of reinforced concrete, the floor of the wardrobes, wooden joint covered with the usual wood flooring.

Inquiry of the architect responsible for this construction brought out this ingenious interpretation of the State regulation. Corridor means only that part of the building walked over in going from rooms to entrances.

There is no provision in the law in the particular State having this precious bit of construction for the enforcement of its provisions or penalty for their violation.

Many States regulate the construction of their school buildings by legislation that aims to bring a co-operation between the State and local authorities. Where such regulation is in operation there has been a decided improvement in school buildings. Legislation should not take the form of definite specification, but should be restrictive only to the point preventing construction below known and approved standards. Some States had passed laws relating to the construction of school buildings in the early eighties, but there was no national movement until after the Collinwood fire.

In 1910 the Department of Child Hygiene of the Russell Sage Foundation requested me to report what legis-

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lation had been enacted throughout the country in the planning, construction, fire protection and sanitation of school buildings.

In making this report a chart was prepared showing the status of compulsory regulation as it then existed.

The 1910 chart showed that only two States, Connecticut and Ohio, had any regulation on fireproof construction, and only one State, Massachusetts, considered fire retarding construction. Six States had regulations on exits, but 13 States required doors to school rooms to open outward.

That the efforts of those interested in safeguarding the lives of school children has brought about a great change in the attitude of legislators since 1910 is shown by an examination of the laws enacted during the past five years, and the regulations in force based on the intent of these laws.

To bring this account of regulations to date another chart has been prepared showing the status of regulations in force in 1915.

Many corrections are yet to be made as there is great difficulty in securing definite and accurate information, also the terms of the law in many States need interpretation by legal authority before the full meaning is clearly brought out.

The chart of 1910 was headed Compulsory Regulation, but the word compulsory is omitted in the chart of 1915.

In a majority of cases the laws as they have been passed state that plans for school buildings must be submitted to a State superintendent or other authority for approval. The laws often provide that rules and regulations are to be drawn up by State Board of Health or State Board of Education, and provide for approval of plans and construction under these rules and regulations by superintendents, agents or inspectors.

This form of control is receiving much approval from both educators and inspectors, as these rules and regulations have all the force of law, and permit of close co-operation between owners and those having the enforcement of the laws in charge.

The most notable instance of this form of regulation is the State of Wisconsin, where the entire control of public and semi-public buildings is vested in an industrial commission.

In my attempt to reduce the various State regulations in force to a comparable basis over 1,000 card entries have been made and filed under the headings of the chart here presented.

In many instances regulations on the same point are so varied as to show the responsible parties had either made no adequate investigation or else became disgusted and prepared regulations based on their own conception of standards.

The 1915 chart shows that only 27 States have yet considered it desirable to exercise control over their school buildings where the children spend one-third of their waking hours.

Twenty-four of those 27 States seem to realize the necessity for a quick exit from these buildings, as they specify with exceptional agreement that doors shall open out.

Seventeen of the 27 also agree that fire escapes are desirable, but only six of the 27 put up fire alarms to warn teachers and children that escape should be made, and only one State, Kansas, would drill its children as how that escape should be carried out.

There is no recognition of the study of Mr. Porter and his method of safeguarding lives by the use of fire walls and horizontal fire escapes, no recognition that the best fire engineers consider outside fire escape obsolete, and that they should be abolished.

Turning from escapes to methods of putting out a fire, it is found that only eight States require fire extinguishers. Six States believe in standpipes, though there is some question about providing any hose, and one State would have sprinklers under certain conditions, but 21 States have no regulations whatever on schoolhouse construction.

When the planning and construction of school buildings is taken up a bewildering array of regulations appear, showing that the bacillus of reform is active, or as one prominent legislator who is also an educational person of authority, recently said: "Reforms are

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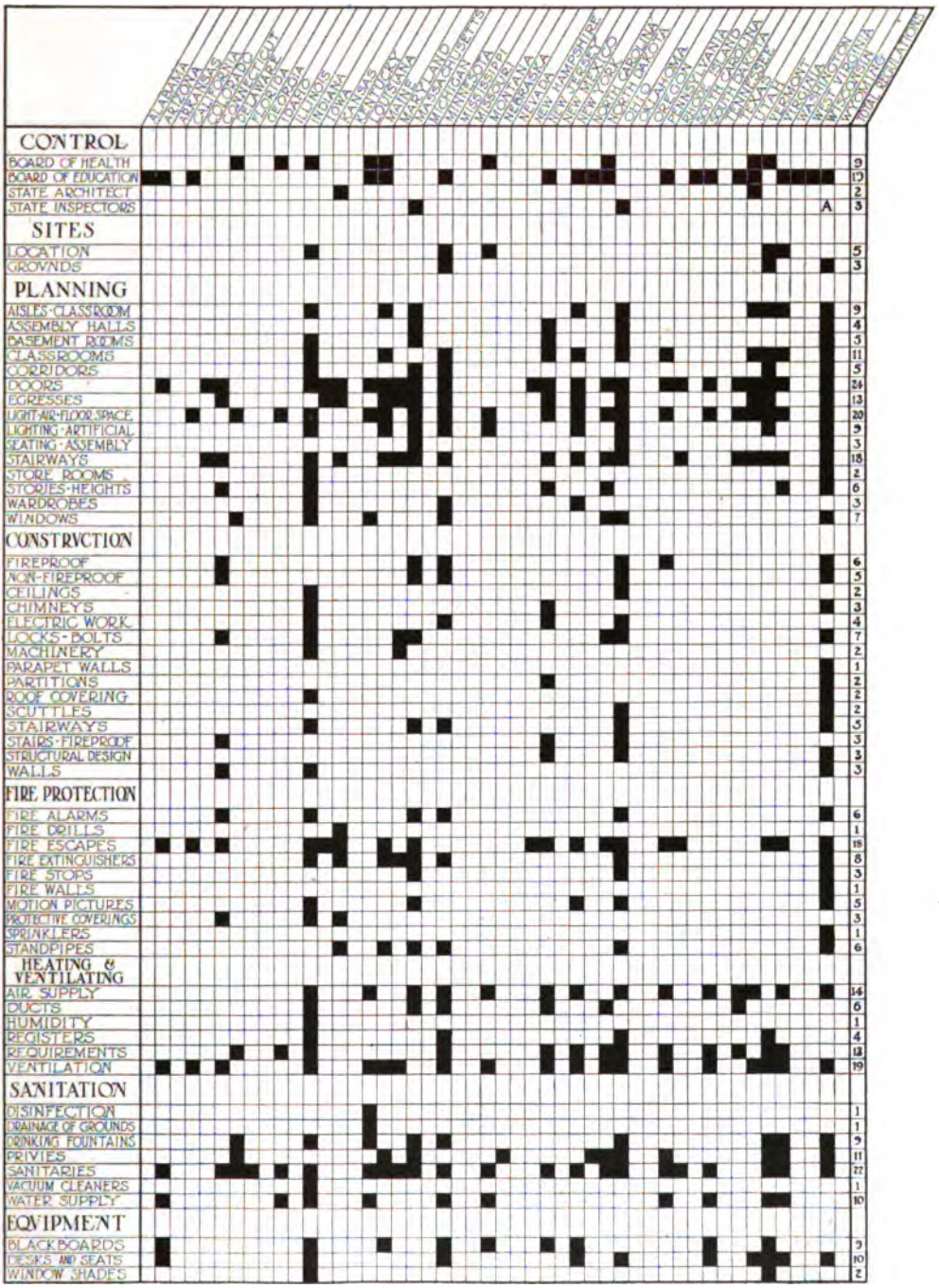
CHART SHOWING STATUS OF REGULATION OF SCHOOLHOUSE CONSTRUCTION IN THE UNITED STATES IN THE YEAR 1915

COMPILED BY FRANK IRVING COOPER., ARCHITECT BOSTON.



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■ INDICATES REGULATION IN FORCE.

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being worked out in various States, and we shall finally discover the most approved method."

But why wait?

The National Fire Protection Association has made many investigations, why should it not draw up in concise form minimum regulations on points that are agreed upon?

Methods for the construction of walls, floors, roof and staircases; the fire-stopping of walls, floors and open spaces; the installation of fire alarms, fire extinguishers, standpipes and equipment—why should not such minimum regulations be prepared and sent to every school authority in the United States with a statement urging their adoption?

Why is it not of as much importance to aid in safeguarding the lives of school children as the lives of operatives in factories?

A manufacturer entrusts the lives of his children to school authorities who provide buildings that this same manufacturer would not consider safe for his workmen without equipping them with automatic sprinklers.

The town jail is usually a safer building than the town schoolhouse.

It is the duty of the National Fire Protection Association to urge protection of school children, because safe school buildings sanely designed can be constructed for almost the same money as the old style fire trap.

EXPLOSIVE HAZARDS IN FACTORIES.

A Rochester subscriber writes:

"I was much impressed by an article in a recent number, viz: 'Explosive Hazards in Factories.' I would much like to know the extinguishing effects of water or chemicals on the explosives you mention in case of fire, and how either would act, also what precautions should be taken while employing same."

We understand that chemical extinguishers, such as Pyrene and other well-known extinguishers, have been used to good advantage in celluloid fires, although the general understanding is that celluloid contains sufficient oxygen to support its own combustion and once ignited will continue to burn in the absence of air, although without flame. For this reason fire cannot be extinguished by excluding air in the same manner as an ordinary fire. Chemical fire extinguishers, therefore, which depend upon the use of carbolic acid gas are said to be of little use, inasmuch as though they may extinguish the flame, they will not stop the combustion.

Water is the best extinguisher of a celluloid fire. Sand is sometimes used, and while the flame may be temporarily extinguished with sand, the celluloid will continue decomposing and emitting gases which will ignite on contact with flame. Should a substantial quantity of celluloid get alight, the extinction of the fire may become a matter of extreme difficulty. It is also of a specially dangerous character, owing to the density and poisonous nature of the fumes, which render it difficult for the firemen to approach close to the seat of the fire. Moreover, the gases given off are liable to form an explosive mixture with the air. The rapidity with which the fire spreads renders its isolation an exceptionally arduous task. Great jets of flame shoot out and the risk to adjacent buildings, even if they are not actually adjoining, is much greater than with an ordinary fire.

MAKING HOSPITALS SAFE.

"I am taking up strenuously the matter of better protecting the lives of the inmates of our hospitals," writes a subscriber, "and I have had considerable work done in them such as protecting stairways with wireglass, placing wireglass doors at intervals in hallways, and also sprinkler heads in elevator and dumb waiter shafts. I have also suggested that regular fire drills be taken up with the nurses and other employes. If there is information SAFETY ENGINEERING readers can give me, or tell me where it can be had, dealing with the safeguarding of lives in hospitals, etc., and also fire drills for the same, I shall greatly appreciate their kindness and assistance."

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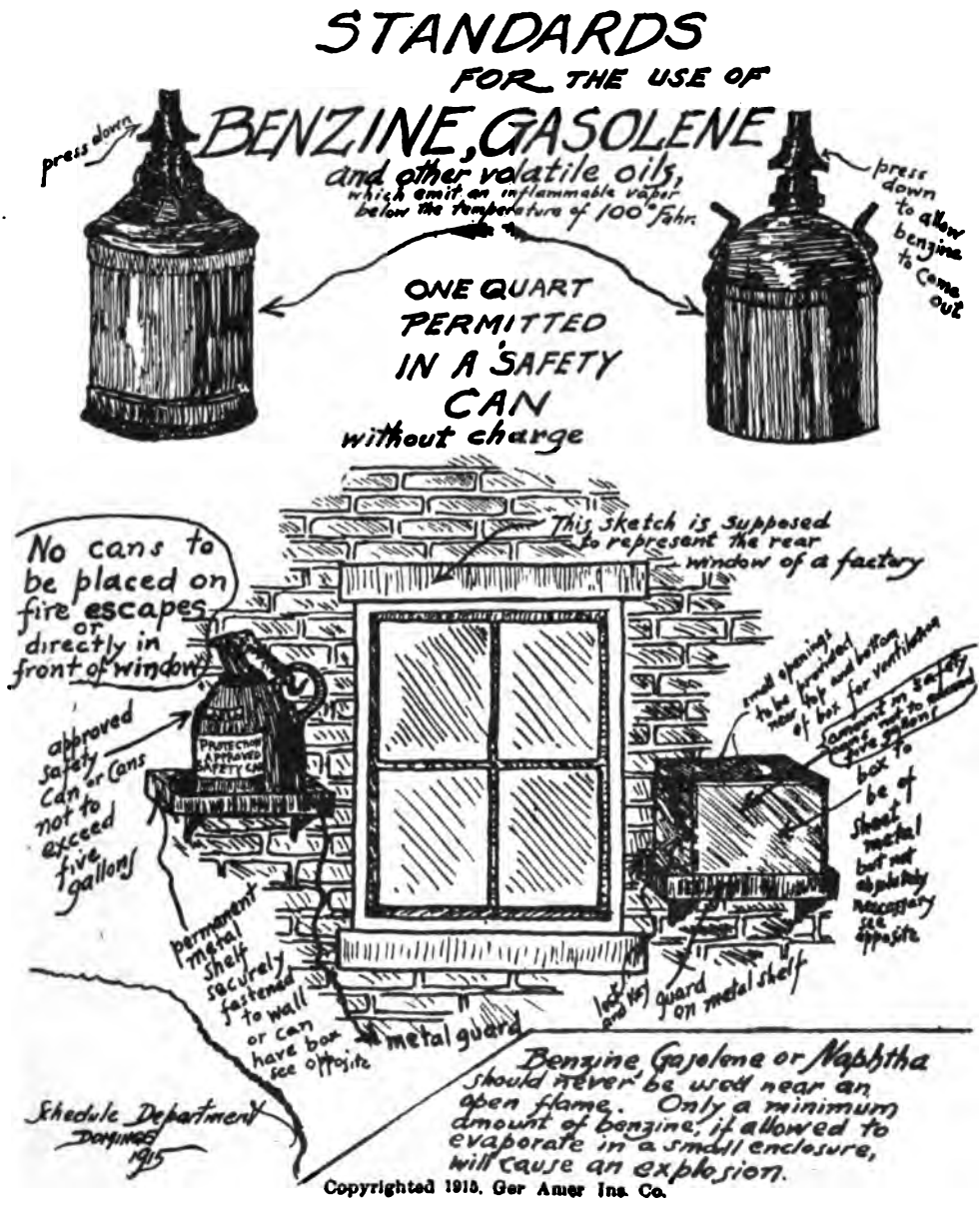
LESSON-PICTURES IN FIRE-SAFETY

THE standards of fire underwriters are really lessons in safety, telling how fire dangers may be reduced or prevented if certain precautions are taken or certain principles followed. The German American Insurance Company of New York has found a way to interpret, pictorially, the admonitions the standards convey. Mr. C. C. Dominge of the German American Schedule Department has drawn a series of striking pictures which the company has published and is circulating, with its compliments, as a method for educating the public. The four pictures that follow show graphically what insurance standards say about the use of benzine and gasolene, coal stoves, show windows and cornices and chimney construction.


STANDARDS
FOR THE USE OF
BENZINE, GASOLENE
and other volatile oils,
which emit an inflammable vapor
below the temperature of 100° Fahr.
press down
press down to allow benzine to come out
ONE QUART
PERMITTED
IN A SAFETY
CAN
without charge
No cans to be placed on fire escapes or directly in front of window
This sketch is supposed to represent the rear window of a factory
approved Safety Can not to exceed five gallons
permanent metal shelf securely fastened to wall or can have box see opposite
metal guard
guard on metal shelf
Benzine Gasolene or Naphtha should never be used near an open flame. Only a minimum amount of benzine, if allowed to evaporate in a small enclosure, will cause an explosion.
Schedule Department
DOMINGE
1915

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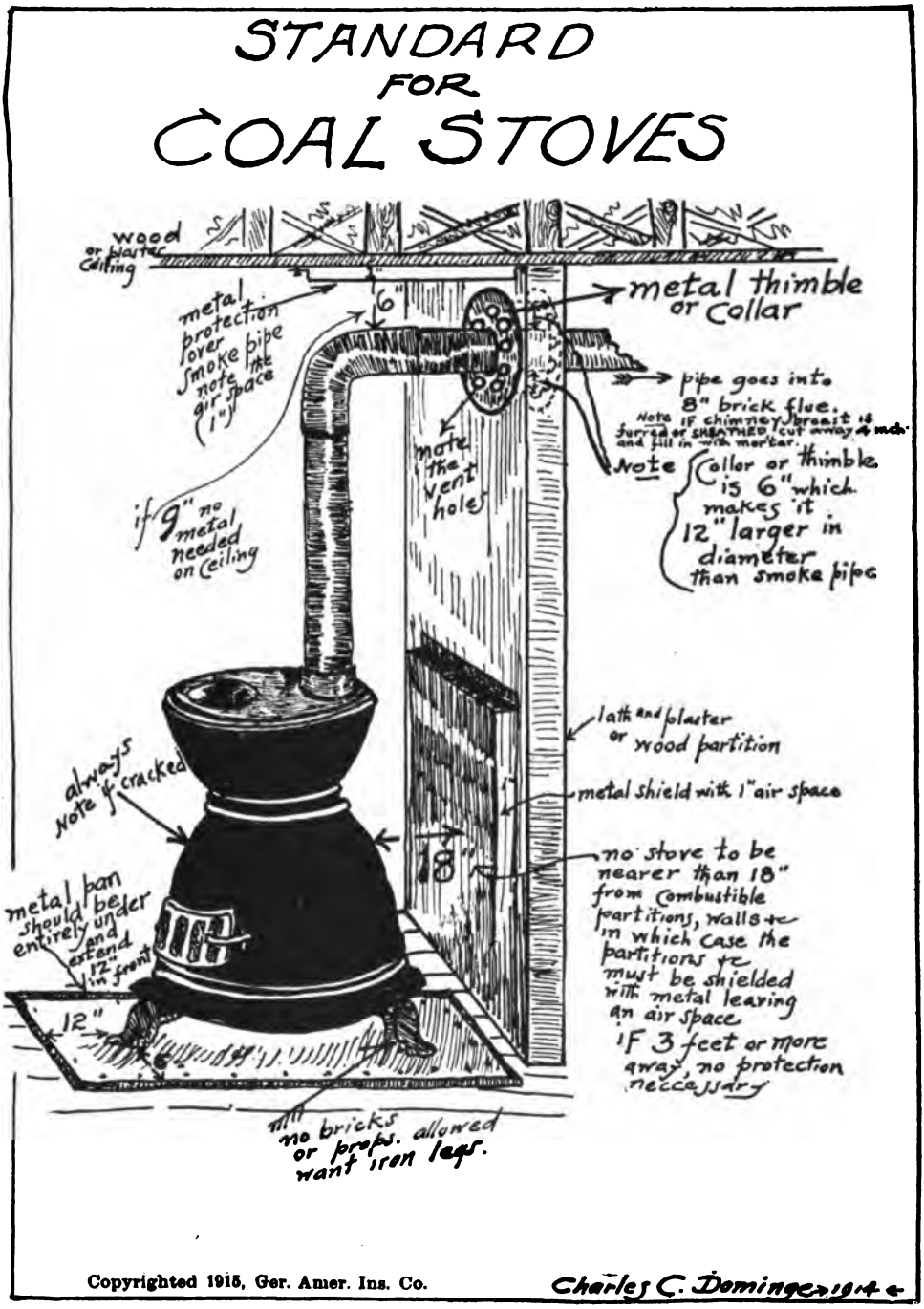
STANDARD
FOR
COAL STOVES
wood or plaster ceiling
metal protection over smoke pipe note the air space (1")
6"
metal thimble or collar
pipe goes into 8" brick flue.
Note IF chimney breast is furred or SHEATHED cut away 4 inch and fill in with mortar.
Note Collar or thimble is 6" which makes it 12" larger in diameter than smoke pipe
note the vent hole
if 9" no metal needed on ceiling
lath and plaster or wood partition
metal shield with 1" air space
always note if cracked
18"
no stove to be nearer than 18" from combustible partitions, walls &c in which case the partitions &c must be shielded with metal leaving an air space
IF 3 feet or more away, no protection necessary
metal pan should be under entirely and extend 12" in front
12"
no bricks or props. allowed want iron legs.
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Charles C. Dominge 1914

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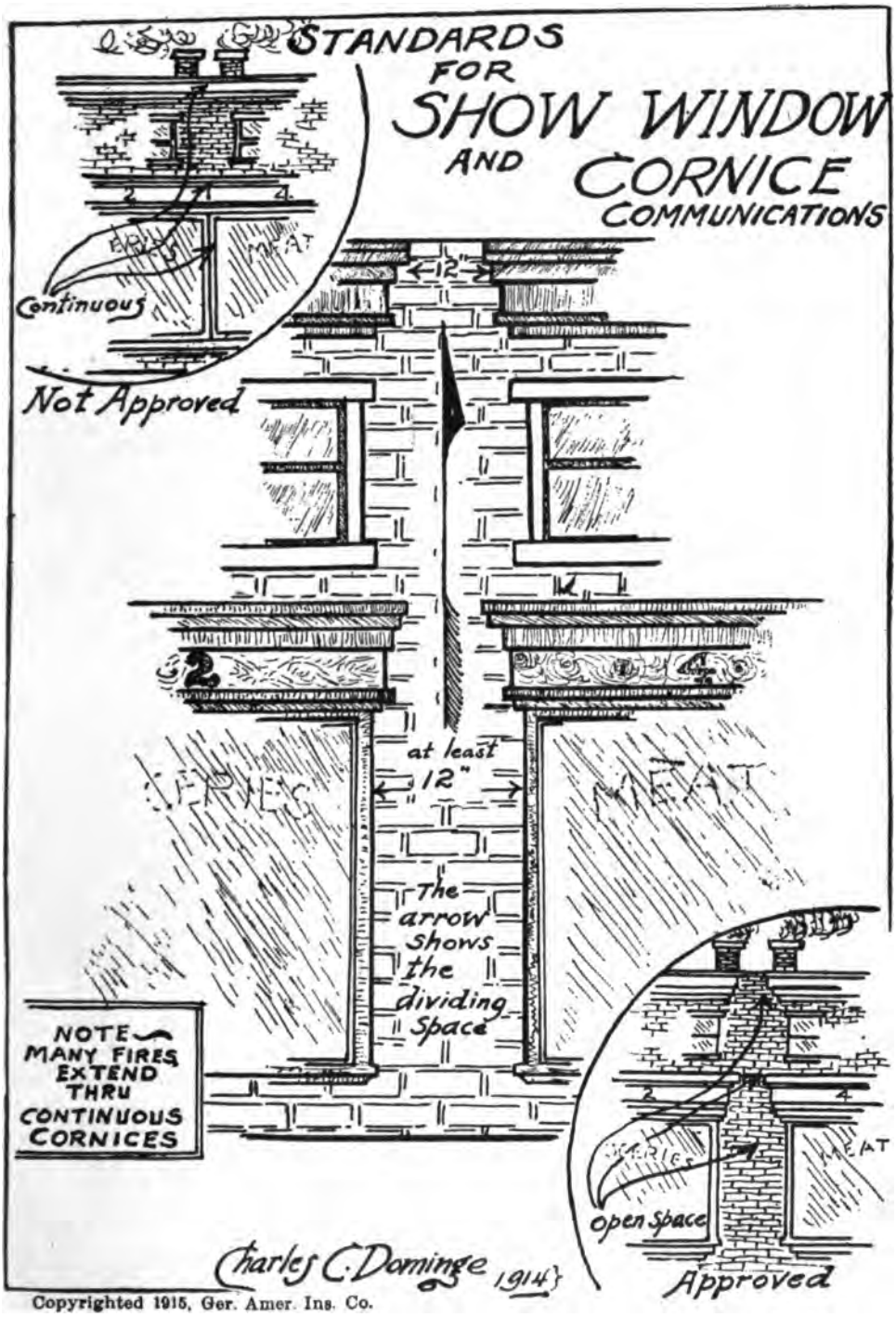

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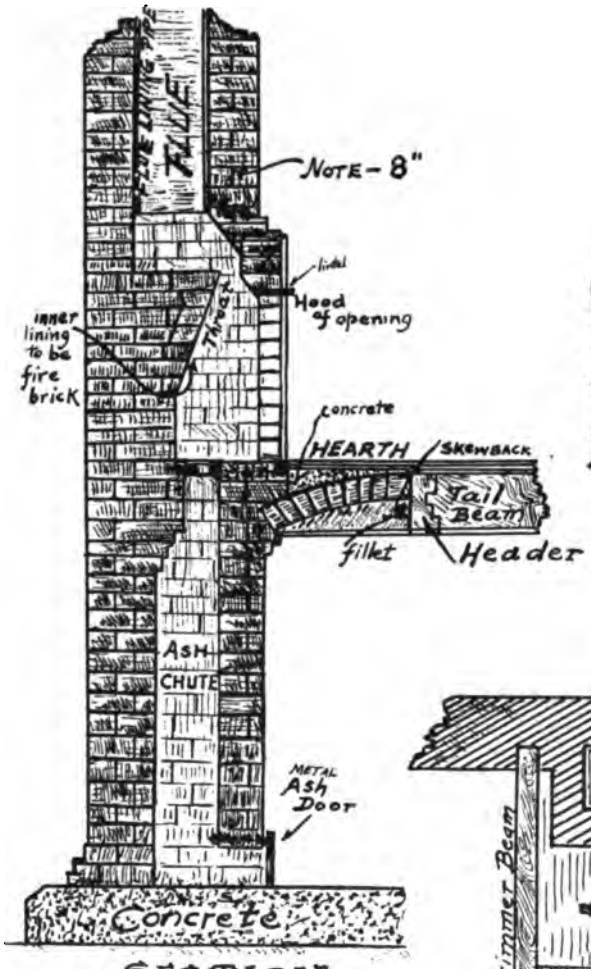
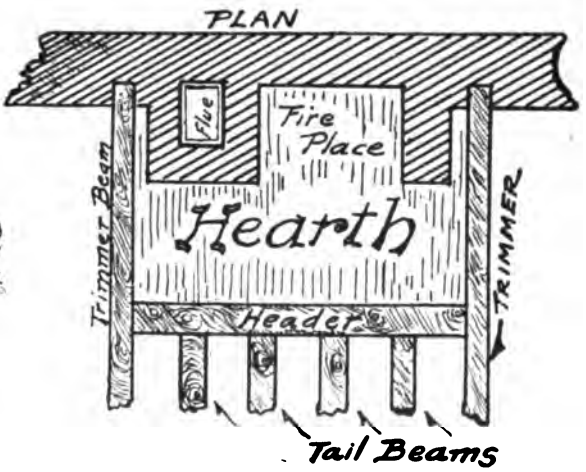
STANDARDS for CHIMNEY CONSTRUCTION



SECTION of CHIMNEY
SHOWING TRIMMER ARCH UNDER HEARTH ALSO PROPER CONSTRUCTION OF FIRE PLACE, FLUE AND FLUE LINING, ASH CHUTE, ETC.

C.C. Dominge 1915

FIRE RECORDS PROVE THAT DEFECTIVE CHIMNEY FLUES ARE RESPONSIBLE FOR THE MAJORITY OF DWELLING HOUSE FIRES.



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GAS AND COAL DUST EXPLOSIONS

COAL-DUST and fire-damp explosions, their causes and the methods that have been employed, or proposed, for preventing them, is a subject that has been much discussed. How a miner can help to prevent coal-mine explosions, and what he can do to save his life and the life of others, when caught in a mine after an explosion, is of inestimable value to him. The experienced miner knows that some coal fields are more gaseous than others, and that in the gaseous districts there is much more fire-damp. These are usually designated as "gaseous mines," hence safety lamps are used. It is said that in mines that make much gas, in which safety lamps are used, disasters rarely occur.

Since 1908, when the Government began to investigate mine explosions, only one has occurred where safety lamps were employed exclusively. Not only does this show that accidental ignition of fire-damp by an open light may be prevented, but that greater care is needed on the part of both the miners and the mine officials. Moreover, in all but one of the accidents that have occurred since 1908, mixed lamps were used —that is, some lamps were open and the others were safety lamps. Some of the explosions occurred where only open lights were in use. It would seem then that the introduction of safety lamps should be heartily welcomed by every miner, even though these lamps may not be as convenient as the open light.

Field Coal Dust Explosion Gallery Erected at Experimental Mine of the Bureau of Mines.

The co-operation of miners is also necessary in the use of permissible explosives in the place of dangerous explosives. In fact, they should insist that permissible explosives be employed. No doubt the operator will acquiesce in such a demand even though it may reduce the cost of coal production.

Proper ventilation is another essential in the prevention of fire-damp. As the State laws provide that only mine officials and the mine inspector can control the ventilation, the miner may, and

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should, call attention to any serious lack of fresh air. He should at all times be on the watch for dangerous conditions, and report them when found. In fact, it is just as incumbent upon him to exercise care in the mine to prevent a casualty as it is in his home to prevent a fire. In a gaseous mine, or in gaseous workings of a mine, every miner and mine employer should bear in mind the following injunctions which are offered by George S. Rice, in a report to the United States Government on "What a Miner Can Do to Prevent Explosions of Gas and of Coal Dust":

Dont carry an open light, even if no gas shows in the safety lamp, when you enter gaseous workings.

Don't carry matches and smoking tobacco.

Don't tamper with your safety lamp; if it is not in good condition go to the lamp station. Test for gas from time to time with your safety lamp, and if there is any gas put a timber across the entrance to your place, mark "Danger" on it, and notify the nearest official.

Don't stand your safety lamp on the ground. It may upset and the flame crack the glass. Hang it on a spike or large nail driven firmly in a post.

Don't enter any place that the fire boss has marked as containing gas.

Close ventilating doors, or any brattice through which you pass.

Watch to see that ventilation stoppings are tight and don't grudge a few minutes of your own time in order to close any hole; it is for your safety as well as that of others.

Don't use black powder or dynamite if your mine regulations require permissible explosives, and if permissibles are not being used, ask the mine officials to have them used.

For the purpose of giving a more lucid understanding of the means generally employed to prevent these disasters, the following shows what has been learned through tests at the bureau of mines at Bruceton, Pa., and through investigation of explosion disasters:

Explosion in Field Coal Dust Explosion Gallery at Experimental Mine of the Bureau of Mines.

All dry dust of bituminous coal and lignite, when unmixed with shale, clay, or rock dust, is explosive when raised into the air and ignited by a blown-out or overcharged shot of black powder or dynamite, whether fire damp is present or not.

An explosion of coal-dust may be started by an ignition of a pocket of fire-damp.

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A dense cloud of coal-dust raised by a heavy fall of roof or the wreckage of a trip of cars may under some conditions be ignited by a strong electric spark or an electric arc.

An explosion of coal dust in air starts with comparative slowness, taking one-half a second to more than a second to traverse the first hundred feet after ignition by a blown-out shot, but the flame travels faster and faster until it may reach a speed of more than 2,000 feet per second.

The pressure just after the blast from a blown-out shot is less than that caused by the shot itself, and the pressure remains low while the explosion is traveling the first hundred feet, but the pressure rapidly increases with the distance traversed if the dust is highly inflammable. Pressures have been recorded of 63 pounds per square inch 350 feet from the origin; 73 pounds 550 feet from the origin; and 119 pounds, or higher than ordinary steam-boiler pressure, 750 feet from the origin. When the flame of an explosion is extinguished, the pressure drops rapidly as the gases cool. Hence it is important to quench the flame near the origin.

The more the coal dust is mixed with shale, clay, or rock dust the slower and less violent is the explosion.

When the mixed dust along a passageway is dry, but contains 60 per cent or more of rock dust, it cannot be ignited by a blown-out shot of ordinary size, but if there is a strong initial explosion of pure coal dust or coal dust and fire damp, the explosion will spread through a cloud of mixed dust containing 60 or, sometimes, 70 per cent of shale. When, however, the proportion of rock dust is 75 per cent. of the mixture, the mixture will not propagate an explosion, even one started by a 300-foot length of pure coal dust. Therefore, when the proportion of rock dust to coal dust is 3 to 1, there is little danger of a local explosion of fire damp starting a coal-dust explosion that, but for the rock dust, might extend through the mine.

When the coal dust, by reason of moisture or ash, is less easily ignited than the Pittsburgh coal dust, or when the percentage of fixed carbon is greater and the percentage of volatile combustible matter is less, a smaller percentage of rock dust will prevent the mixed dust from exploding.

An air blast or pressure wave moves ahead of the flame of an explosion and makes the extension of most coal-dust explosions possible. Coal dust, as long as it remains in a layer or coating, is not dangerous, but when a cloud of it is raised into the air by a concussion or air blast, and a flame enters the cloud, the dust may burn violently. On the other hand, if the dust is wet or is so sticky that it will not rise into the air, there will be no explosion of dust.

The direction or the strength of the air current has no appreciable effect on the movement of a dust or gas explosion. The pressures produced by the explosion are so great that an opposing current is instantly reversed.

It has been proposed to reduce the oxygen in the mine air to 19 per cent or less, by the introduction of black damp, to prevent explosions, but if the normal proportion of oxygen in air (21 per cent) were reduced not more than 2 per cent with a corresponding increase of black damp, an explosion would not be prevented, and a miner's health would suffer from continuous work in such impure air. In other words, the reduction of oxygen impairs health more than it lessens the explosibility of the coal dust.

The methods of preventing coal-dust explosions, according to the means used, may be grouped, as follows:

Lessening the production of coal dust.

Preventing coal dust, whether necessarily or unnecessarily made, from being spread through the mine.

Preventing coal dust from being ignited.

Preventing coal dust from being raised into the air by a concussion or an air blast.

Making coal dust, in dry mines, harmless by mixing or covering it with rock dust or fine ashes.

Using secondary checks or safeguards such as are now known as "rock-dust barriers," as well as preventive measures.

A cheap and easily constructed wooden gallery, for demonstrating the

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explosibility of coal dust at miners' field meets, has been designed and tested with satisfactory results by George S. Rice and L. M. Jones of the Bureau of Mines.

The gallery is constructed of rough 1-inch boards, nailed to timber sets of 3-inch by 4-inch material, erected on 6-foot centers. The gallery measures 7 feet in width and 6 feet in height, inside of the timber sets, and should be approximately 85 feet in length. The length may be reduced somewhat if necessary. Six inches beneath the roof are shelves of 1-inch by 12-inch material, which are supported, one at each timber set, by two nails in each of the uprights.

The gallery is left open at both ends, and 12 feet beyond one end a cannon, consisting of a discarded 9-inch liner from an explosive, testing cannon, which can be supplied by the Bureau of Mines upon payment of transportation charges, is set on timbers so as to be a foot above the ground level, with the bore hole parallel to the axis of the gallery. From in front of the cannon, and extending to a point 3 feet within the gallery, a platform on which to place dust is erected. A heavy wire is fastened to an eye bolt, screwed into the front of the cannon, and is stretched over all of the shelves, being attached to each by a nail on the top side near the edge away from the cannon. The cannon is braced loosely by a timber, extending from it to a pile of dirt in the rear, so as to allow a recoil of from 1 foot to 2 feet, which, by means of the heavy wire attached to the dust shelves, will effect the dumping of the dust.

Each of the shelves should be heaped with the dust to be tested and placed on the four nails of each timber set so as to be balanced thereon and yet to be dislodged easily by the recoil of the cannon. More of the dust should be heaped on the platform in front of the cannon, extending from the cannon for about 15 feet so as to propagate the flame from the cannon to the dust within the gallery. Roughly, 200 pounds of coal dust will be required for each demonstration. Cannon should be charged with one pound of "FFF" black powder tamped with 3 pounds of clay.

When the cannon is fired, all of the dust shelves should fall so as to prepare a cloud for the propagation of the flame throughout the gallery. If the coal dust is inflammable, the flame will pass along the dust in front of the gallery and will then be sent through the cracks between the boards of the sides and roof and finally emerge at the opposite end of the gallery. Wet the boards before each test to prevent their taking fire.

DANGER OF "V" TYPE MOTOR.

"A point that has come to my mind that appears to be a pertinent one for delineation in a magazine devoted to the interests of safety is the following," a subscriber to SAFETY ENGINEERING writes:

"The automobile market is being flooded with cars equipped with a motor of the V type. Large numbers of these cars have the carburetor situated in the center of the V, with no provision for removing any overflow of gasoline that may appear. It is comparatively simple for a defective spark plug, or a leaky exhaust pipe, to ignite the gasoline vapor arising from such overflow, and the hood and fan form an ideal flue for carrying the flames from the motor, back underneath the body of the car. Several fires of this nature, already have been called to the attention of the writer. Every carburetor so situated should be provided with a funnel or pan, underneath it, and a drain pipe to remove the overflow from the motor."

GRADE CROSSING PROTECTION

Under the laws of New Hampshire, grade crossing protection is controlled by the Public Service Commission. The commission has ordered that enamel metal signs 12 by 24 inches with white letters on a blue ground, shall be placed at varying distances from grade crossings. If any town for 60 days neglects to comply with the order, it forfeits $1 for each day. Anyone injuring or defacing these signs, is liable to a fine of $10.

If fire marshals had been appointed for small towns about 15 or 20 years ago, there would not be such large fire losses in the cities of the present day.—*R. R. Faitoute.*

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TESTS OF FIREPROOF FLOORS.

In order to secure uniform and comparable results from the tests of fireproof floor fillings between steel beams, to determine the safe working loads for variations of span and amount of reinforcement of systems, approved previously after a fire test, the Bureau of Buildings, Borough of Manhattan, City of New York, has

Load Test.

adopted the third point method of loading as its standard. All load tests conducted hereafter under the auspices of the bureau are to be in accordance with the standard.

The bureau's description of a test is:

"A section of the floor construction to be tested, four feet wide, is constructed between steel beams spaced at a distance corresponding to the maximum span for which the floor is to be used or approved, and continued at each end into adjoining sections of the same thickness and construction and of one-half the length of the test span. Not later than one month after construction the load shall then be applied on the test span at two points located each at one-third of the span length from the ends of the span, and in such a manner that it bears on the upper surface for the full width of the floor construction and an equal distance each side of the third-point line not exceeding in any case more than one-half foot either side of that line. A bed of loose sand, not over one inch thick, may be placed at the local point to secure a uniform application for the load. Care must be taken to so apply the loads that they will be equal at the two points of application. One-sixth of the total load causing failure will be allowed as the uniformly distributed working load."

A test for the National Fireproofing Company was typical of the type of loading. The construction consisted of a 4-inch slab of cinder concrete on a span of 7 feet 6 inches between steel beams, with a 2-inch cinder concrete fill and a 1-inch cement finish, making a total thickness of 7 inches. The slab was 4 feet wide.

The load was applied by piling pig iron on a platform supported on 10 by 12 timbers placed at the third points of the span, set parallel to the supporting beams and bedded in a cushion of sand. Care was taken to maintain a symmetrical load over both bearings. The arch deflected at a uniform rate to a total of about three-quarters of an inch when the construction collapsed.

No exaggerated deflection was obtained, as occurs ordinarily with a uniform load of pig iron placed directly on the arch. The slab failed under a load equivalent to 1,660 pounds per

Result of Test.

square foot, distributed uniformly, and, in accordance with the regulations, was approved for one-tenth of that amount as the working load. At failure practically all of the wires broke under one concentration and the concrete crushed above the point.

The bureau's explanation of the advantages of the method of testing is:

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"The test can be made readily in the field with any available material of sufficient gravity to be suitable for load, or may be made as a laboratory test in a testing machine. The results of several tests are comparable, being entirely independent of the nature of the material used as load. The personal equation of the operator is eliminated.

"The results are definite and unmistakable. An uneven loading at the two points of application (which is difficult to avoid) affects only slightly the resultant working loads; a difference of 10 per cent between the two applied loads makes a difference of less than 2 per cent on the working loads. The effect of shear in the test arch at and near the supports (the critical points) is the same as if the test load were uniformly distributed, so that a reasonable factor of safety in this respect is provided."

COMMENTS OF N. F. P. A. ON FIRES.

Giving a record of unsatisfactory or serious fires in buildings equipped with sprinklers, the National Fire Protection Association said that where sprinklers failed the cause was, almost invariably, clear. For the record, cases were selected to indicate such causes, so that they might be understood generally and met satisfactorily.

On one case the association said: "All electrical devices used in connection with operating machinery where films are handled should be properly enclosed. Films should be stored in approved vault of masonry, or, if less than 200 films are to be kept, these should be stored in approved double-walled cabinets, with proper vents to outside of buildings. Buildings where films are stored or handled should be equipped throughout with automatic sprinklers."

Some of the association's comments in notes intended to illustrate the efficiency or inefficiency of signaling, retardant or extinguishing agencies.

SPRINKLER HEADS.—The necessity of locating sprinkler heads so that the water may reach every part of the building is clearly emphasized by the association.

OPERATION OF SPRINKLER SYSTEMS.—Watchman and engineers should be thoroughly instructed as to the operation of sprinkler systems and alarm apparatus. Frequently serious fires develop because some one closes the gate valve before ascertaining if there is a fire.

ALARM DEVICE.—Where there is not a watchman it is imperative that the sprinkler system be provided with some alarm device to prevent such a condition.

UNIFORM THREAD.—The importance of uniform thread of couplings and hydrants is clearly emphasized, also the necessity for frequent test and repairing of hydrants.

Some of the association's comments on fire causes, selected to illustrate defects, either of construction or superintendence:

DIP TANKS.—All dip tanks should be provided with automatic covers and overflow pipes.

OPEN CIRCUITS.—Arrangements should be made for opening the circuit to all electric heating devices, such as flatirons, etc., whenever the plant is not in operation.

WATER-TIGHT FLOORS. — Water-tight floors should be required in all plants where a heavy water loss is possible to the lower floors. The use of scuppers for carrying off the water is recommended.

WIREGLASS WINDOWS.—Metal windows with wireglass would have prevented fire entering the building.

AUTOMATIC FIREDOORS. — Standard automatic firedoors between the picker and lapper rooms, also between lapper and dry rooms would have confined the fire to the place of origin.

HOSE CONNECTIONS.—Rubber hose connections should be replaced by flexible metal tubing or permanent piping.

SAVED BY GOGGLES.

A hose coupling became loose and broke in the plant of the Merchants' Dispatch Transportation Company in Rochester, N. Y. A shower of cinders struck the riveter, cutting the side of his face. His eyes, however, were not injured, because he wore goggles.

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INJURED BY DANGEROUS ARTICLES IN RAILWAY TRANSPORTATION

FIVE hundred accidents in the railway transportation of explosives and other dangerous articles were reported to the Bureau of Explosives, New York City, in 1914. Giving the particulars in his annual report to the executive committee, Chief Inspector Dunn said: "The growth in reported losses—total number of accidents and total cost—from 1911 to 1913 is believed to be due to the fact that our increase in reports was more than the decrease in accidents, caused by a gradually increasing enforcement of the regulations. If this be true there is reason to hope that from now on our totals will show a gratifying decrease."

Summary of the reports:

CLASS	Number Killed	Number Injured	Number of Accidents	Property Loss
Explosives	0	5	9	$14,106.50
Acids and Corrosive Liquids	0	23	192	5,139.47
Inflammable Liquids	9	24	80	152,457.16
Inflammable Solids	2	38	168	90,212.78
Compressed Gases	0	24	12	862.88
Unlisted Semi-dangerous Articles	2	0	39	20,227.32
Totals 1914	13	114	500	283,006.11
" 1913*	2	40	490	359,623.00
" 1912*	8	21	335	338,582.00
" 1911*	12	26	302	126,766.00

*Latest figures.

A table has fifteen prominent instances of the rough treatment of cars that contained 298 packages of dangerous explosives. The particulars are:

Entire load shifted. End of car forced out of line. Three boxes dynamite broken.

Rough handling of car caused bracing to break loose and damage to 16 kegs, five of which leaked powder.

Entire load shifted one inch. Car end forced out of line ½-inch. End boards cracked at height of 10 inches. Four boxes dynamite broken.

One case so badly damaged that its contents were strewn over car floor.

Car roughly handled en route, causing damage to 22 boxes.

Car handled so roughly that the tops of 16 boxes in a row towards center of car were completely sheared off.

Eleven cases dynamite badly damaged due to rough handling of car.

Eighteen cases dynamite badly damaged due to rough handling of car.

Nine cases dynamite badly broken due to rough handling.

Thirty-six kegs black powder damaged by rough handling of car.

Rough handling of car caused car end to be broken in and damaged 7 boxes of dynamite.

Bracing broken down from rough handling and 100 kegs damaged and powder spread over car floor.

Entire load forced against bracing with such force as to damage 19 boxes of dynamite.

Twelve cases dynamite broken due to rough handling of car.

Rough handling of car had caused boxes in second row to shear off completely the tops of boxes in preceding row and spread over floor of car cartridges of dynamite in broken condition. 24 cases broken.

On the following page is a summary of personal injuries (11 persons killed and 109 injured) in the transportation of dangerous articles.

The most serious personal injuries from any one accident in 1914 were from a fire caused by motion picture films. The chief inspector comments thus:

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"This is an illustration of how a disastrous accident can be caused by an article not in the most hazardous class. At the time this report is written a final decision as to the steps to be taken to prevent a recurrence of this unfortunate accident has not been reached. Irrespective of the rules that may be adopted by the American Railway Association, or by individual carriers, it is clear that the first necessary step is educational. Thousands of messengers are traveling daily with packages of motion picture films on passenger trains, and few of them realize the dangerous possibilities of injury to railway passengers due to their packages.

"In attempting to bring about an improvement in such conditions it is the well established policy of the Bureau of Explosives to get into touch first with the headquarters of an industry. In this case the manufacturers of picture films, the exchanges that control their distribution and, finally the exhibitors who control the traveling messengers, are the interested parties. Two general conferences have taken place between the chief inspector and representatives of these organizations.

The seriousness of the risk and of the difficulty in minimizing it have been readily admitted by all parties in these conferences, and offers have been received to co-operate with the chief inspector in this first educational step. A circular letter, accompanied by a copy of our special bulletin, has been distributed in large quantities by the picture film manufacturers and exchanges. It is hoped to have this circular and bulletin reach practically all of the traveling messengers."

Summary of Personal Injuries.	No. of accidents.	Persons killed.	Persons injured.
Acid, sulphuric	98	—	21
Charcoal	52	—	2
Gasoline	40	9	20
Acid, nitric	24	—	1
Gas, compressed carbonic acid	5	—	1
Gas, compressed acetylene	4	—	1
Moving picture films	3	2	36
Acid, hydrofluoric	2	—	1
Cement, rubber	1	—	1
Drier, Japan	1	—	1
Gas, compressed chlorine	1	—	20
Gas, compressed oxygen	1	—	2

ENGINEERING CONGRESS.

The materials of engineering construction will receive special attention in the proceedings and discussions of the International Engineering Congress to be held in San Francisco, September 20-25, 1915.

The field will be treated under 18 or more topics, covering: Timber resources; preservative methods; brick and clay products in general; life of concrete structures; aggregates for concrete; water proofing; volume changes in concrete; world's supply of iron; life of iron and steel structures; special steels; status of copper and world's supply; alloys; aluminum; testing of metals, of full sized members, and of structures.

About 25 papers are expected for the volume, prepared by authors representing five different countries. The list of authors includes many of the most eminent names in this field of engineering work throughout the world.

The papers, together with discussions contributed by leading American and foreign engineers, will be published as Volume 5 of the transactions, and will be illustrated with charts, diagrams and half tones.

Careful housekeepers have few, if any, fires. —*C. W. McKeehen.*

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TEXAS FIRE STATISTICS FOR FIVE YEARS

A REPORT of the fire insurance commission of Texas under date of April 19, 1915, has the following particulars of 49,000 fires in the State since December 10, 1910, as reported to the State fire marshal:

CAUSES OF FIRES.

Fires in Dwellings, Apartment Houses, Boarding Houses and Private Outhouses.

PREVENTABLE FIRES.

Cause.	No.	Per cent.
Flues	3,447	15.3
Exposures	3,365	15.0
Conflagrations	255	1.1
Stoves and heating	2,162	9.6
Kerosene lamps	796	3.5
Curtains, gas	686	3.0
Electric wiring	831	3.7
Ashes, candles, carelessness	895	4.0
Parlor matches	800	3.6
Gasolene and volatiles	734	3.3
Kerosene Stoves	478	2.1
Fireworks	81	.4
Burning grass and rubbish	213	1.0
Spontaneous combustion	174	.8
Cigars and cigarettes	289	1.3
Electrical appliances	255	1.1
Totals	15,461	68.8

UNPREVENTABLE FIRES.

Sparks on roofs	1,047	4.7
Incendiary	481	2.1
Lightning	885	4.0
Totals	2,413	10.8
*Unknown causes	4,588	20.4
Totals	22,462	100.0

Mercantile, Special Hazards and Other Classes.

PREVENTABLE FIRES.

Cause.	No.	Per cent.
Exposures	6,826	25.7
Conflagrations	664	2.5
Cigars and cigarettes	733	2.7
Stoves and heating	587	2.2
Flues	549	2.1
Electric wiring	1,126	4.2
Gasolene and volatiles	767	2.9
Kerosene	160	.6
Fireworks	110	.4
Spontaneous combustion	471	1.8
Parlor matches	595	2.2
Curtains, gas	222	.8
Lights, miscellaneous	472	1.8
Burning grass and rubbish	122	.5
Rubbish	212	.8
Ashes and coals	45	.2
Electrical appliances	235	.9
Fuel oil	22	.1
Kerosene stoves	13	.1
Ashes, rubbish, carelessness	65	.2
Totals	13,996	52.7

UNPREVENTABLE FIRES.

Incendiary	1,052	4.0
Sparks on roofs	264	1.0
Lightning	496	1.9
Machinery	478	1.8
Boilers	84	.3
Slab pits, shaving vaults	43	.2
Dry kilns	22	.1
Cotton fires	1,554	5.8
Dust explosions	7	.0
Cotton gin fires	1,130	4.2
Totals	5,130	19.3
*Unknown causes	7,412	28.0
Totals	26,538	100.0

The following classes contributed the greatest number of losses:

	No.	Per cent.
Dwellings—owner, frame	12,580	25.7
Dwellings—tenant, frame	8,065	16.4
Dwellings—owner, brick	387	.8
Dwellings—tenant, brick	158	.3
Dwellings—owner or tenant	88	.2
Totals	21,278	43.4
Mercantile buildings, brick.	5,930	12.1
Mercantile contents, brick.	8,572	17.5
Mercantile buildings and contents, frame	3,216	6.6
Totals	17,718	36.2
Special hazards and other classes	10,004	20.4
Grand Total	49,000	100.0

*Taking the proportion of preventable fires from unknown causes to be the same as for known causes, the ratio of preventable fires in the above class is 86.5 per cent.

*Taking the proportion of preventable fires from unknown causes to be the same as for known causes, the ratio of preventable fires in the above class is 73.2 per cent.

Slow-thinking, unintelligent men should not be placed around machinery or in places where presence of mind is required, for, by so doing, the probability of accidents is increased many times.—*R. E. Smith.*

The average working man is prone to show less alertness of mind and activity of body as he feels that he is being mechanically protected from danger, and he concludes that he is thereby relieved from the responsibility of watchful care and prudence during every moment of the day.—*J. C. Robinson.*

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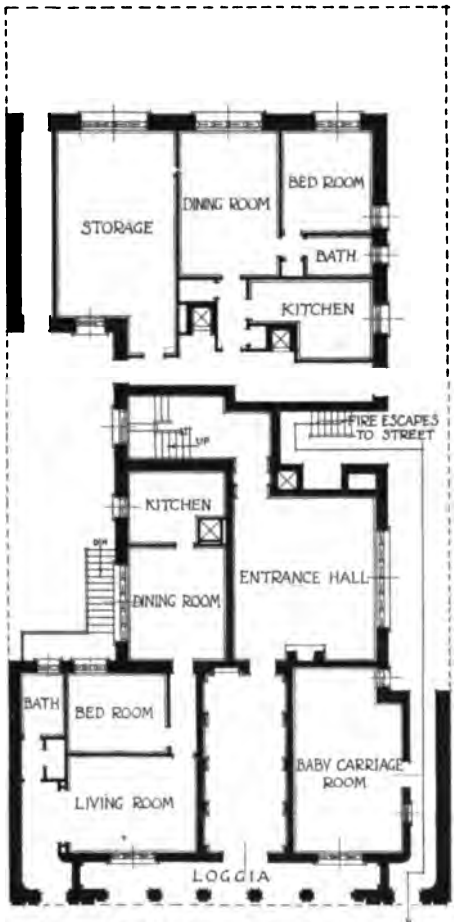
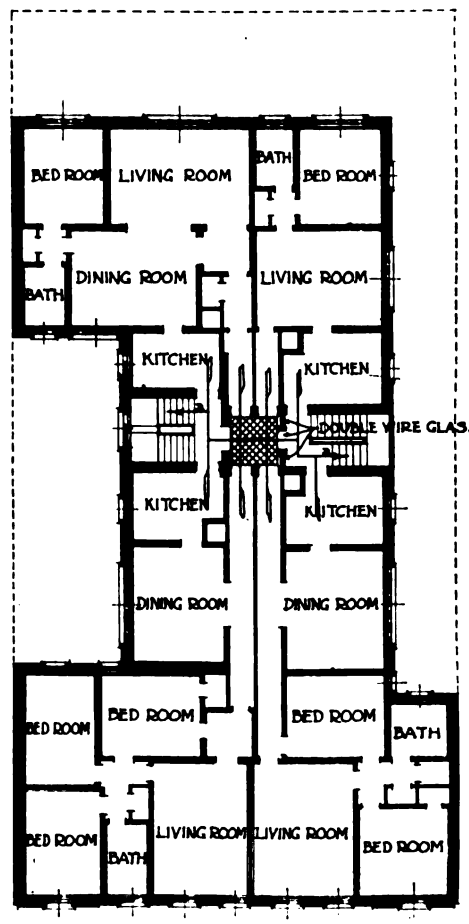


FIRST FLOOR PLAN



TYPICAL FLOOR PLAN

SECRETING FIRE ESCAPES.

A plan for the treatment of fire escapes on non-fireproof tenement houses has been devised by Andrew J. Thomas, architect, New York City. It has created interest in architectural, building and real estate circles.

Expressing his views on the plan, Robert D. Kohn, president of the National Fire Protection Association and former president of the New York Chapter of the American Institute of Architects, said:

"The plan would not only be a device adding to the safety of occupants of the ordinary non-fireproof tenement, but its application would greatly add to the appearance of the city.

"New York City has more non-fireproof tenements than any other class of buildings, and any improvement of that class of buildings, therefore, would do a great deal toward beautifying the city. Unfortunately, too few of the skilled architects have had anything to do with the planning of tenements, and it is exceedingly gratifying to find a man of Mr. Thomas's calibre devoting his time to that thing."

Mr. Thomas received from the New York Chapter of the American Institute of Architects, two years ago, a medal for designing the best house of its class, a four-story tenement in the Borough of the Bronx. He received last year the first honorable mention for designing another house.

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EDITORIAL

Teach Safety to the Children.

THE school children in a western city will have to ponder no more over cube root, greatest common denominator, troy weight and the like, if the recommendations of a committee of eight public school principals are accepted. The committee declared that this work is a waste of time, and offered as substitutes such practical tests as the following: Working out of problems in city finances, figuring estimates on city improvements, compilation of budgets, measuring of the city's area, etc. The committee added, very wisely, that by the elimination of useless work and the substitution of practical problems—the kind the students will meet in every-day life—greater efficiency can be obtained.

No doubt the new studies will include full instruction in "Safety First," which means the conservation of life and property by preventing needless accidents and fires. If a girl or boy leaves school knowing how many dangers may be avoided by simply being careful, the coming generations of Americans will not possess the characteristics of utter thoughtlessness and carelessness regarding these subjects that are national traits at present. Knowledge of cube root is not worth as much to the average school boy or school girl, in after life, as knowing what to do in cases of emergency, or going farther back than that, knowing how to make impossible, or at least improbable, an infinite variety of "emergencies" that are due to somebody's folly. Figuring out problems in city finance and measuring a city's area will help school children, when they grow up, to have a better understanding of municipal problems, and it will add something to their qualifications as citizens. But the principles of "Safety First" can be applied every day, almost every moment of the day. And municipal finance will show savings in the cost of maintaining fire departments, hospitals and police departments when safety habits and safety practices prevail in a community. The greatest common denominator of American life today is waste—of life, limb and property—and the proper way to bring about a change is by a proper instruction of children in the public schools.

Safety Engineering's New Cover.

IT is expressive of the progress of the safety movement as well as of the progress of the magazine. The predominant color is green, the symbol of safety—rather more appropriate for the front door of "The Magazine of Safety" than the danger color, red. Therefore, safety has eclipsed danger on the cover of SAFETY ENGINEERING.. That reminds us that the emblem of this magazine has attained popularity in the world of safety, and has influenced the use of "green for safety, red for danger." The emblem is used by many associations and manufacturers, with the consent of SAFETY ENGINEERING; and in some other places without a previous request for permission to use it. That, of course, is because its appeal was irresistible, and manufacturers and others adopted it because they wanted to be in the fashion

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without delay. As the design is not copyrighted its general use is agreeable to the publishers, but their pleasure is intensified whenever they have an opportunity to reply affirmatively to a request to use the emblem.

On the July cover will be noticed sketches of several devices that symbolize the guarding of machinery and protection against fire. The automatic sprinkler is accorded prominence on the July cover on account of its record in saving life and property.

The Good Men Do.

TO the lay mind, an insurance company is usually simply a collection agency of premiums and a disburser of losses. To those who have had an opportunity to study a modern insurance company, whether it be life, casualty or fire, such a conception proves, indeed, fallacious.

Instead of being simply financial institutions, insurance companies today are veritable beehives of engineering activity, dealing, principally, with all branches of prevention, whether it be sickness, fire or accident. Especially is this true of the fire and casualty companies. They are laboratories and engineering institutions of the first magnitude, dealing not with a single phase of our industrial fabric, but with all of them—transportation, manufacturing, mining, power production and transmission, construction work, chemical industry, etc.

If the activities of these business institutions were properly understood by the public at large and by the legislators, they would not be subjected so frequently to attacks, legislative and other. In actual constructive work in relation to the prevention of sickness, fire and accidents, they are doing more than all governmental activities combined. Why not sometime appoint legislative investigating committees to inquire into the good men are doing, instead of always appointing such committees to probe into human shortcomings, real or alleged?

Nineteen Dead Is Toll of July Fourth.

DESPITE all the rational argument and eloquent insistence that have been advanced to convince the patriotically disposed that the national glory cannot be expressed in a loss of human life, shattered limbs, deafening noise and the odor of burnt powder, the recent Fourth of July indicates that Young America is as yet only partially awake to this important fact. A compilation of casualties occurring in all parts of the United States during the two days' celebration show that nineteen lives constituted the sacrifice. This is an increase of seven over the total of deaths last year, but it is a large decrease from the number of fatalities in preceding years. The total number injured this year was 459, as compared with 879 last year.

Of the casualties, Hartford, Conn., had the most misfortunes, having 41 to its credit, Cincinnati had 29, Detroit 12, and Baltimore 10. No city is charged with more than one fatality. The toy pistol maintained its reputation as the greatest maiming implement, having 62 to its credit.

A large increase is shown in the fire losses, however, the total for this year being $206,000 as compared with approximately $100,000 on the previous anniversary of the Nation's birth. Nearly one-half of the loss on the recent Fourth was sustained by Ridgeville Corners, a small town in Ohio, which suffered to the extent of $75,000.

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ELEMENTS OF SAFEGUARDING

BRICK MAKING

By F. W. Bail.

PERHAPS the oldest of all industrial arts is the manufacture of brick. It dates back to at least 4,000 years B. C. In those early days, as records show, Chaldeans made an enormous amount of sun-dried and heat-burned face brick for their thick walled houses and huge stepped terraces. In intervening time, the product attained various degrees of perfection in Rome, Lombardy, the Netherlands, and in fact, in most clay abounding regions. But the industry as a whole, until the nineteenth century, was essentially one of hand craft. Obviously as such it had few inherent hazards. However, in common with all other industries, the making of brick did not escape the great wave of machinery introduction which swept all civilized countries in the past century and today it possesses rapid production methods and intricate mechanical devices which now make it one of the largest and most scientific enterprises and, in many respect, a dangerous one.

The industry is fortunate in that many of the so called inherent hazards can be easily eliminated by slight changes in practices or by the application of guarding principles, and the incentive for such safe practices has been further stimulated by the fact that the workmen's compensation insurance underwriters offer a substantial reward for such endeavors in a reduction in premium, under the well known, Universal Analytic Schedule. A few of the accepted safe practices and safety devices will be pointed out in this article.

The method followed in the removal of material from the clay bank, pit, or mine, varies greatly with the nature of the clay and the local topographical conditions, but there are certain fundamental practices that can be employed with comparative safety under all average conditions.

Clay is commonly obtained from banks or pits. Where such is the case, the safest method is accepted to be that of plowing large areas at a time and shovelling the loose clay into wagons or scraping it off. Whereas this is the safest method, it is seldom used, because of the time and labor involved. Mechanical appliances have been extensively introduced and used with various degrees of success and where care is exercised the hazard has not proven excessive. Such contrivances as steam shovels and various types of bucket excavators are used extensively. Incidentally, this method minimizes the cave-in hazard, increases efficiency and in the case of bucket excavators produces a more even mixture of clay. The mechanical hazards connected with these appliances can be practically eliminated without decreasing the efficiency of the device. This is equally true as respects the hoisting engines, boilers, etc., connected therewith. It is taken for granted, of course, that all boilers must be equipped with an effective safety valve, water gauge and all other appliances necessary for safe operation, and as far as the engine is concerned the cross heads, connecting rods, cranks and gears are to be enclosed and the drums on the hoisting engines should likewise be guarded to prevent cable "whip-backs." A number of good alarms and other devices preventing excessive tipping of steam shovels are on the market also and should be applied wherever practicable.

The accompanying sketches indicate other safe and efficient methods of working a clay bank. The steps shown in Fig. A should be kept at least 5 feet in width and the steps in Fig. B at least 4 feet in width, the sides in each case should not be more than 10 feet in height with a slope not greater than 70 degrees to prevent sliding. Where these dimensions are kept, the workmen are mostly on the level with the top of the car or above it and this

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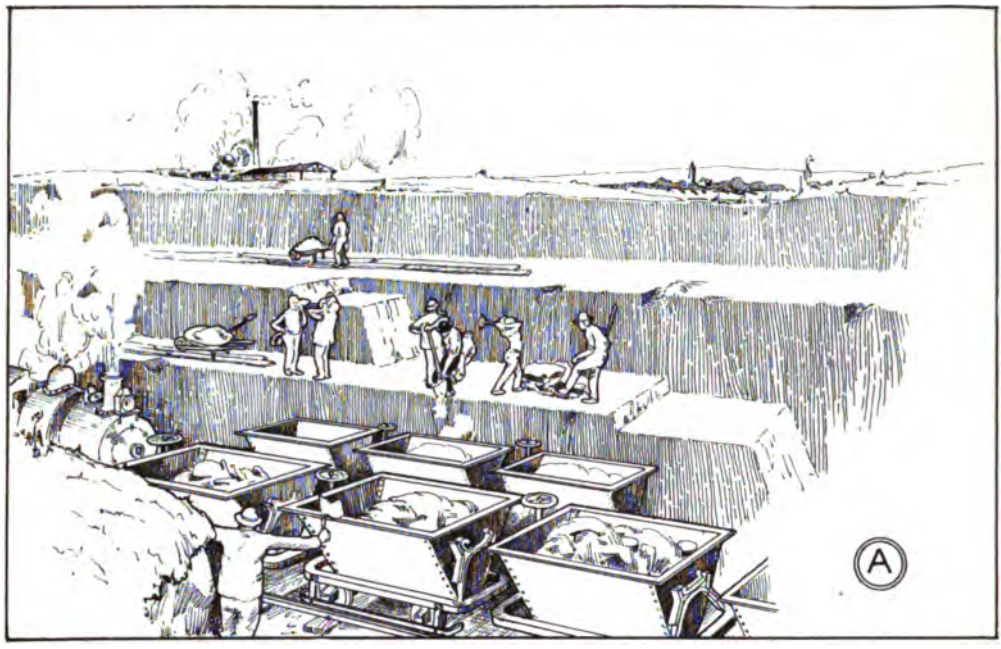

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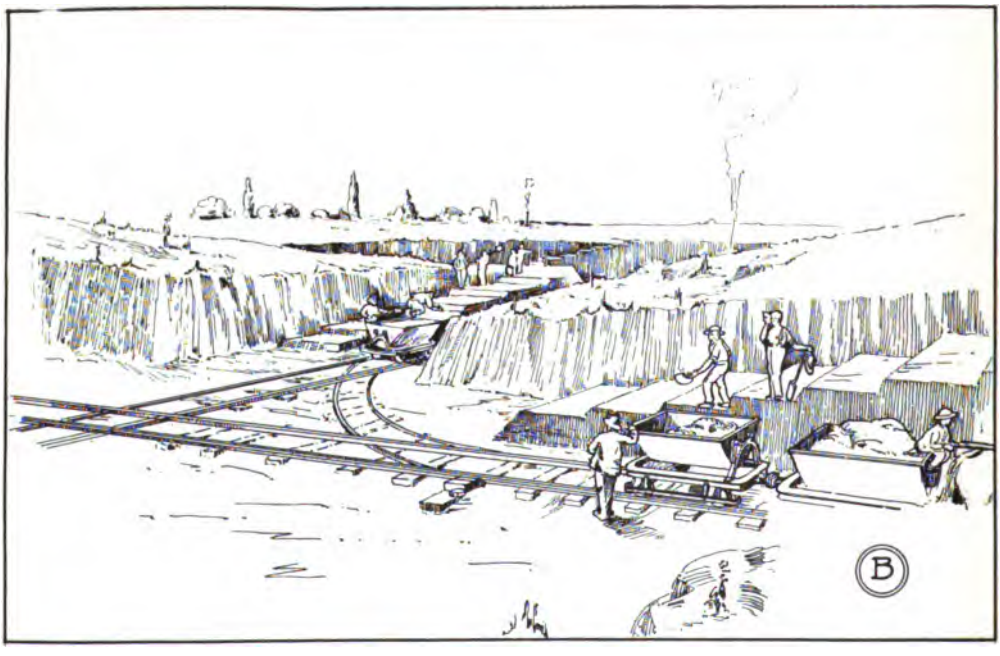

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tends to produce quick as well as safe loading.

Underground clay mining, of which comparatively little is done, involves practically the same hazards as does coal mining. As this phase will be treated in future articles, it will be but briefly referred to here. It may be mentioned in passing, however, that cave-ins which are quite frequent in underground clay mining are usually caused by excessive charges in deep shot-holes and by poor temporary shoring. The Bureau of Mines at Washington has handled this subject extensively and its pamphlets on the subject are so clear that we can well refer anyone interested to them, and in fact they should be in the hands of all operators of underground clay mines.

In laying out tracks from the clay bank, it should always be remembered that the straight track with low grades is always safest and usually cheaper in the end. Where possible, a double track system should be installed even though the tracks are of a portable nature. Accidents frequently occur on the single track with sidings and the increase in hauling facilities which a double track affords more than pays the additional cost of installation. Great care should always be exercised in the laying of the tracks that there is ample clearance between them. Twenty-four inches should always be the minimum clearance from all stationary objects or between cars passing, and where possible this distance should be increased to 30 inches.

Direct haulage, either by means of chain or cable drive, is considered the most economical, although horses and locomotives are often necessary on account of special conditions. With the former method, especially where endless chain haulage is employed, small cars should be used as they distribute the load more evenly on the haulage system and for that reason are safer to handle. Of the various types of cars, the side tipping is not alone more quickly, but also more safely unloaded than the old box type which necessitates a tipping frame for unloading. A pawl and ratchet placed on the axle of each car is very essential to operate this system with safety. The pawl should be so constructed that it can conveniently be held out by the hand and returned automatically to the ratchet as soon as released. It is counted good practice to set automatic stops on the inclines where hauling is only in one direction, but such automatic stops should in no instance be an excuse for the absence of automatic stops on individual cars. Where aerial tramways are used, all passageways should be effectively barred. Many serious accidents have been reported due to dropping of material from the buckets. If passageways are necessary beneath them, conspicuous danger signs should be placed at all approaches, drawing attention to the hazard and cautioning care while passing under to observe whether any buckets are directly above.

"Hand-brick-making" where practiced today is usually done in connection with the same equipment as is used for "wire-cut-bricks," except that in the former process the pug mill is usually of the vertical type and of course no cutters are used. A description of the guarding for the equipment used in making "wire-cut-bricks" will therefore suffice for the two processes. The guarding of the individual machines for the "wire-cut" or "stiff-plastic" methods follows:

The grinding mills or dry pans and the wet pans for plastic clays may be guarded on the same principle. Fig. 3 shows a dry pan, with a revolving grid, completely protected. It will be noticed that the large crown gear is entirely encased in sheet metal. Insurance inspectors demand this. Numerous serious accidents have occurred when sudden shocks to which this gear is often subjected have caused segments to break off and fall on the operator. Accidents have also occurred where an oiler went up and fell in the gear and became seriously mangled. Nothing less than complete enclosure is deemed sufficient and this solid form of guard for gears has the additional advantage of protecting the gears from the settling dust. The pulley being

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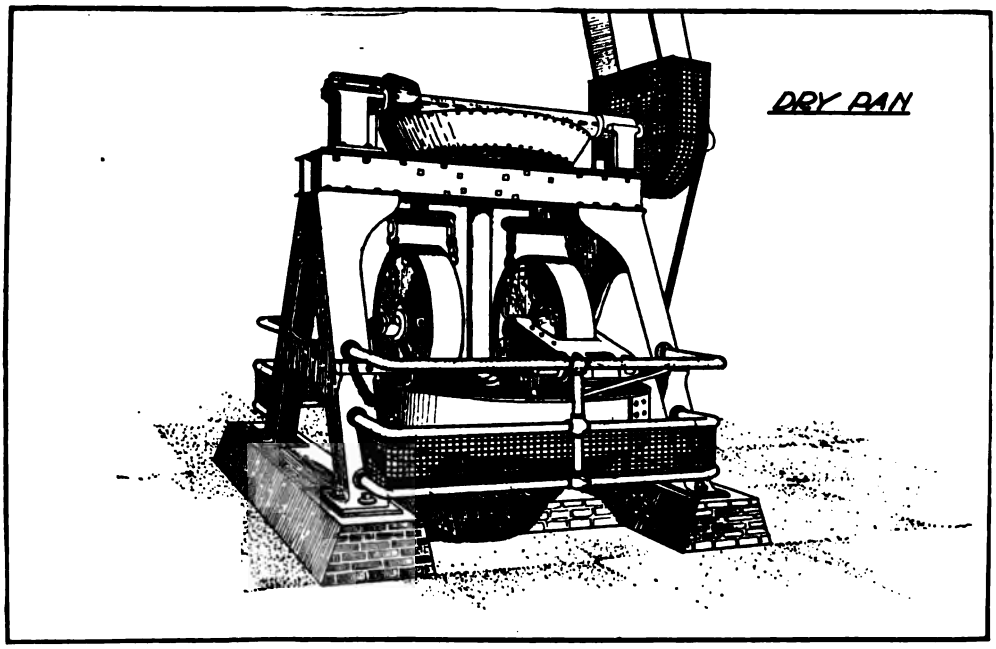

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Fig. 3.

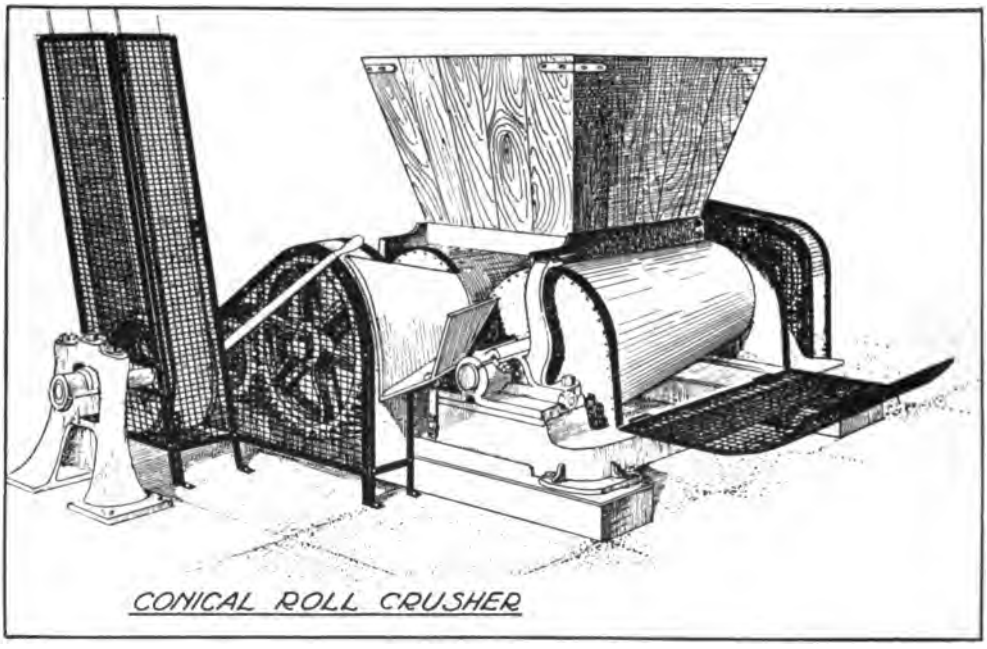

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Fig. 4.

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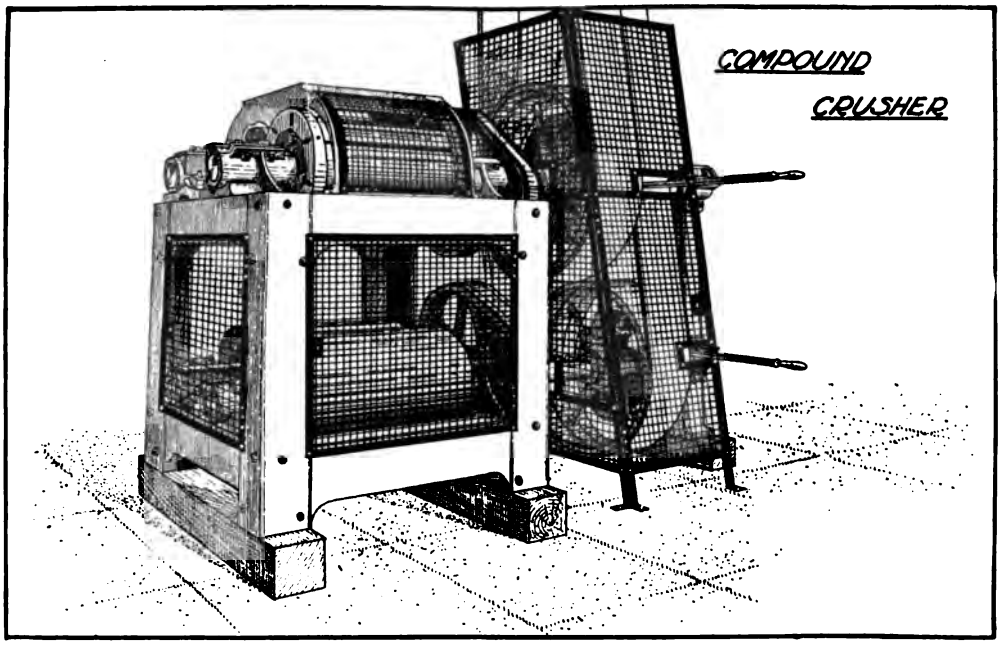

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Fig. 5.

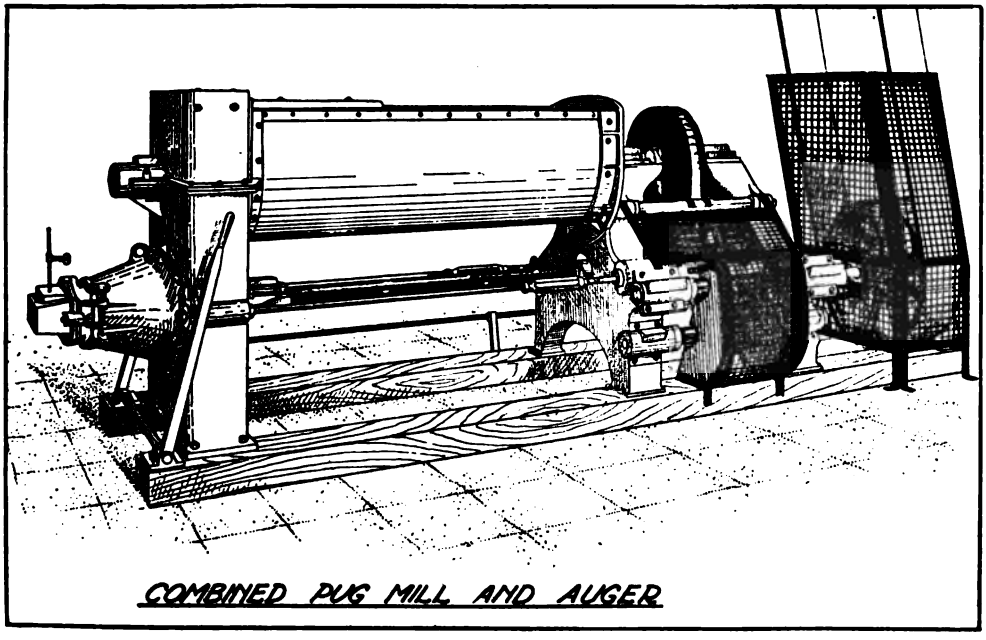

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Fig. 6.

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close to the bearing naturally needs protection also and is so shown in the cut. The shaft is shown completely protected. The revolving grid is guarded by a standard pipe railing.

In plants where crushing rolls are necessary, these should be either equipped with an arm length hopper or be fed from an opening in the floor above. This opening should be completely surrounded by standard pipe railing. Workmen are prone to thrust their feet into these openings to dislodge lumps of clay and numerous serious as well as fatal accidents have been reported from this source. The railing is often objected to by the workmen as a nuisance, being in the way, as it were, but if properly installed it should cause little delay if the workmen are furnished with soft wooden sticks for cleaning the rolls and chutes, which can be done from outside the railing. Where conical rolls are used, adequate means should be provided for carrying off the refuse. Smooth conical rolls and double ribbed rolls for sticky clays are shown in Figs. 4 and 5, the cuts clearly indicating the proper guarding of the driving pulleys, gears and rolls.

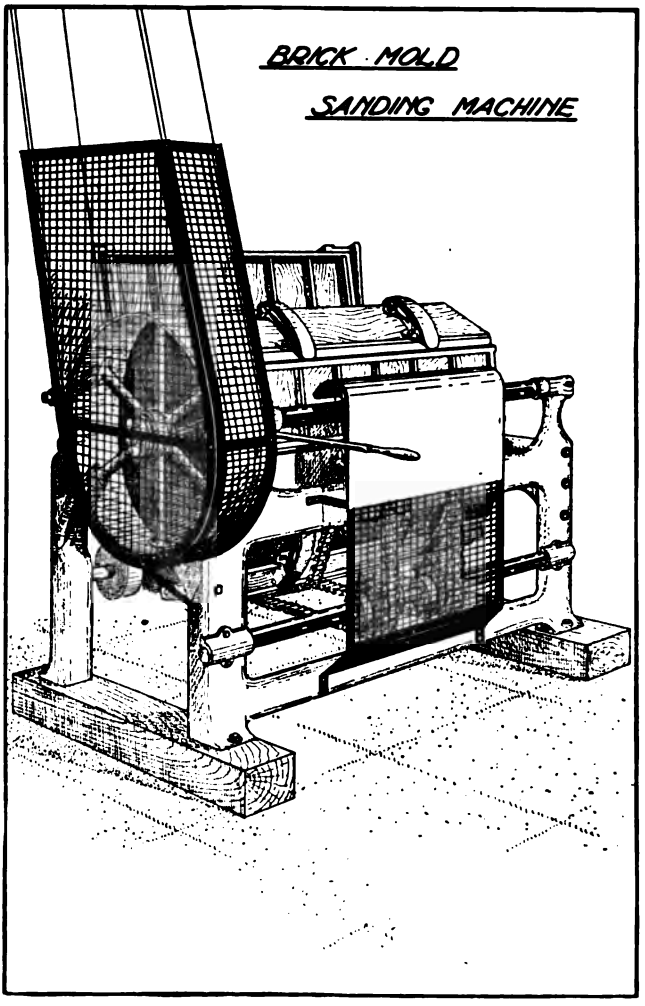

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Fig. 7.

Where open mixtures are used they should be covered with wire grills of sufficient strength to sustain falling persons. The pug mill should have the driving belt, pulley, all power driven gears and shafting protected as shown in Fig. 6. In addition, each machine should have independent control either in the form of a friction clutch which can be locked out, or with a tight and loose pulley with belt shifter equipped with automatic lock. Motor-driven pug mills should have all openings in the motor exposing rotating or live parts covered, the motor casing should be grounded and a safe insulated type of starting box applied. Practically the same specifications apply to mechanical brick molders. In the case of brick mold sanding machines, the dangerous sprockets and chains should be guarded in addition as indicated in Fig. 7 to prevent operator's clothes getting caught in it.

The driving mechanism of automatic cutting tables often presents a very serious hazard. All power driven shafting, couplings, gears and dangerous cams should be protected. Two

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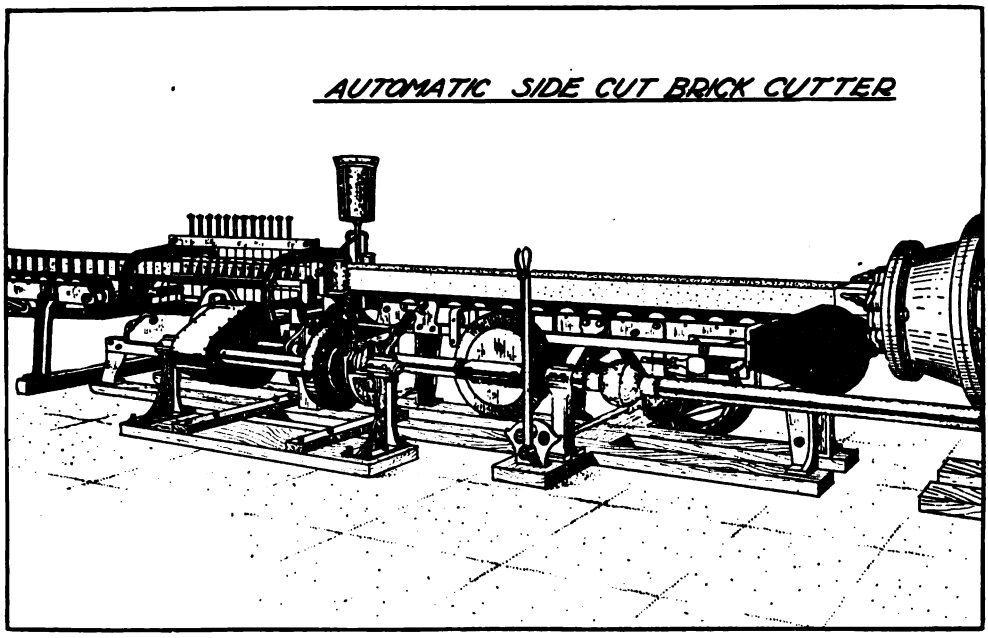

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Fig. 8.

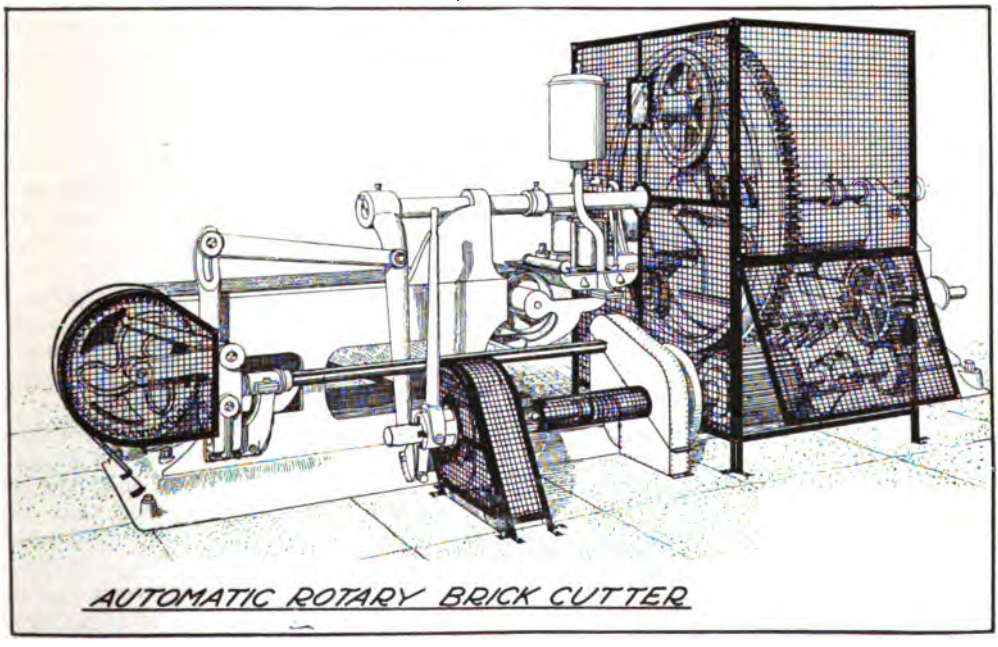

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Fig. 9.

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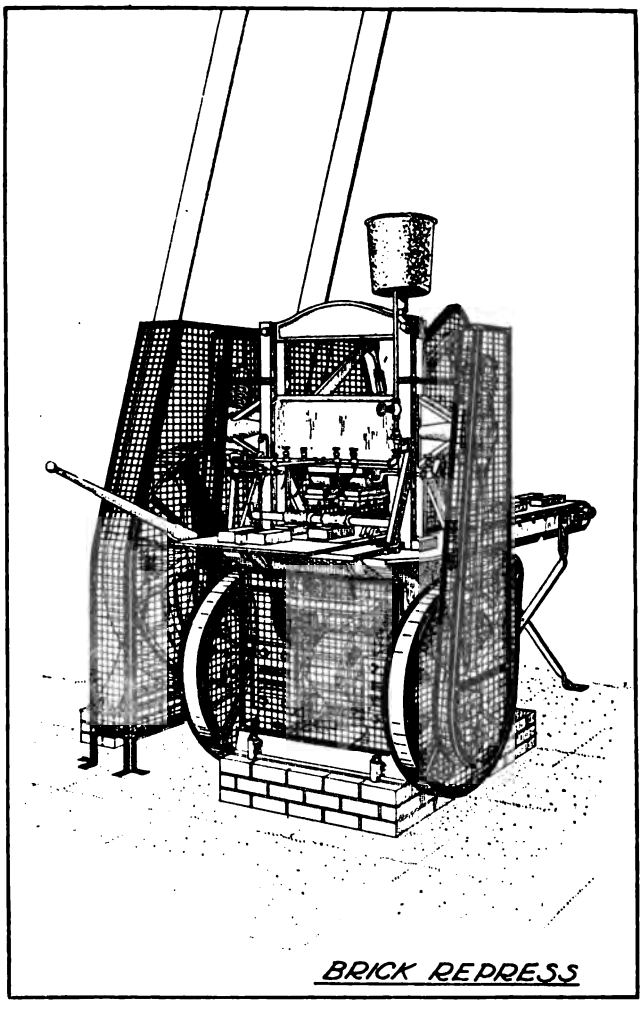

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Fig. 10.

typical cutters, the side cut and the rotary, are shown in Figs. 8 and 9. Great care should be exercised when guarding the latter that the guard for the cutting frame interferes in no way with the replacing or adjusting of the wires. The guarding as a whole of both machines is self-explanatory and needs no further elaboration here.

The brick repress, whether actuated by a screw, toggle lever, eccentrics, or cams, usually has very dangerous driving clutches and shearing points. These should be guarded. Fig. 10 shows such a repress completely protected in approved manner.

The equipment for the "soft-mud" process by which common filling or rough wall bricks are made is practically the same as that used in the "stiff-plastic" process with the exception of the additional disintegrators and crushing rolls. These are guarded similarly to those already described. A type of brick making machine is peculiar to this process, that is, a machine that presses the clay into the molds by means of press plates connected to a ramp. Many accidents have been reported from this type of machine due to raising or lowering the press plate by a notch adjustment. This operation is often performed without stopping the machine, an exceedingly dangerous practice, which should not be countenanced. The machine should be supplied with individual drive by an automatic locking clutch or tight and loose pulley with locking belt shifter. This would minimize the time lost in stopping the machine to adjust these press plates and would minimize the frequency of accidents from same. The press plates should also be equipped with adequate hand rails.

The "dry-press" process, by which some types of face brick are manufactured, is not used extensively in America. This method involves the forcing of a nearly dry clay into steel molds in which they are subjected to an exceedingly high pressure. The other machines used throughout this industry are otherwise similar to those already described. The modern German method of manufacturing "sandline" bricks will be reserved for a future article as it involves entirely different hazards and equipment.

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In many locations, bricks are still dried by exposing them in the open air. Frequent accidents are reported from this process due to careless handling or stacking of the bricks. In other localities, different types of driers employing mechanical conveyors, steam pipes and blowers are used. All the moving equipment on these mechanical devices should be carefully guarded according to standards. It is also suggested that operators be furnished gloves in the handling of bricks on conveyors. This will prevent many serious burns and cuts.

The old type of "bee-hive" kiln is universally recognized as the most dangerous. They require frequent inspection for flat spots in the vaulting and equally for excessive strain on kiln bands. The rectangular construction of the "skove kiln" with tapering walls is usually set up of green bricks and removed when the bricks are burned. In this construction, care should be taken that the courses are laid level. Where continuous kilns are used, the fire openings are often left uncovered as well as the waste heat openings. These openings, where possible, should be protected by standard hand rails as it is found that covers are often misplaced. At least, if rails are not provided, the covers should be permanently chained and be in such position that they cannot be kicked off. Asphyxiation is not an infrequent accident around brick kilns and care should be taken to thoroughly ventilate the kilns before men are permitted to enter. The poisonous carbon monoxide gas, odorless, tasteless and colorless, thereby making it particularly dangerous, should be driven out before the kiln is re-entered. Gas or oil fuel creates an explosion hazard which should also be taken care of, as this hazard becomes particularly apparent if burner connections are cut off or snapped out. If this happens, the fuel should be turned off and the chambers thoroughly ventilated before the same are relighted. Pilot light supply for auxiliary tanks may be effectively used to overcome this danger.

The subject of hazards in brick and other clay production industries is so that it cannot be successfully treated in a brief article of this nature. It is believed, however, that the following of the suggestions herein contained will do much toward eliminating the danger of the industry as a whole and assist in putting that industry in common with others on a "Safety First" basis.

LABOR LEGISLATION.

The annual summary of labor legislation in the United States prepared by the Bureau of Labor Statistics, which appears as Bulletin 166, represents the activities of 17 legislative bodies in this field in the year 1914. Four of these met in extraordinary session, two of them enacting no labor laws.

Compared with the current year, for which the work of 49 legislatures will have to be reviewed, this was an "off year" for the majority of State legislatures, so that the volume of output should be compared with that of 1912, though the number of extra sessions brought the total of the law-making bodies meeting that year up to 24.

The tendency of this class of laws to increase in bulk that has been in evidence for a number of years is manifested in the fact that the 24 bodies in session in 1912 furnished but 187 pages of bulletin text, while the 17 meeting in 1914 provided about 200 pages.

A railroad "full-crew" law was enacted in Mississippi, and one was repealed by referendum in Missouri, these being the only States acting on this subject for the year. The State of Kentucky adopted a new mining code, and the Wisconsin Industrial Commission drew up a set of regulations for the protection of workmen engaged in building operations.

The subject of workmen's compensation received attention from three or four legislatures by way of amending acts, while new laws were enacted in Kentucky, Louisiana, and Maryland. In the last named State the law superseded an earlier enactment which had been entirely inoperative, while the Kentucky law was found constitutionally defective before it became operative.

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THE COLLECTIVE INSURANCE AND UNIVERSAL SAFETY EXHIBIT - P.P.I.E.

STATUE OVER MAIN ENTRANCE

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INSURANCE AND SAFETY AT THE PANAMA-PACIFIC EXPOSITION

A GREAT Exposition, as a whole, impresses the visitor by its heterogeneous mass of exhibits, its many styles of architecture, the ingenuity of its creators, and the stupendousness of its conception; while in the moments of repose, there comes to one's mind certain distinctive features—the great Pennsylvania electric passenger locomotive on its revolving turntable in the Palace of Transportation; the trans-continental telephone; where one may hear a person talk from New York to San Francisco in the Palace of Manufactures; the gigantic model of the Panama Canal on the Zone. There is always something in each section, which one remembers with distinct clearness.

The section devoted to Education and Social Economy in the Palace of Mines, contains a booth, which for its distinctiveness of design, the ingenuity displayed in its conception, coupled with the exceptionally interesting exhibit, will linger long in the minds of visitors. This is the booth of the Collective Insurance and Universal Safety Exhibit, which has received from the International Jury of Awards a gold medal. The caption "Universal Safety" is a further propaganda in the safety field, being employed first in the far reaching Universal Safety standards of the Workmen's Compensation Service Bureau and by the National Safety Council. The exhibit was conceived and is maintained by the Insurance Field Publishing Company of Louisville, Kentucky, and The Safety Press, Incorporated, publishers of SAFETY ENGINEERING, New York City.

The booth, furniture and arrangement were designed by Alonzo H. Gentry, architect, New York City. The statue over the main entrance was designed by the architect and executed by Osborne, the California sculptor. It represents stable insurance overcoming

INTERIOR OF REST ROOM

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EAST END OF THE BOOTH-SHOWING A PORTION OF THE FIRE PREVENTION. FIRE RESCUE EXHIBITS

BIRD'S-EYE PERSPECTIVE OF SAN FRANCISCO IN RUINS AFTER THREE DAYS' CONFLAGRATION, APRIL 18 TO 20, 1906
FIRE LOSS TO PROPERTY, ESTIMATED $400,000,000

PANORAMA OF SAN FRANCISCO AFTER THE FIRE OF APRIL 18-20, 1906

WEST END OF THE BOOTH SHOWING SAFETY DEVICES IN GENERAL

1906

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INTERIOR AT THE WEST END OF THE BOOTH SHOWING SAFETY DEVICES AND APPROVED GUARDS ~

MODEL OF A BURNING HOUSE NEAR THE CENTER OF THE BOOTH ~

READING ROOM AND REST ROOM FACING THE U.S. GOVERNMENT MINT EXHIBIT ~

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DISTRIBUTING STATION OF "SAFETY PRESS, INC." PUBLICATIONS~

the three-headed dragon—Loss by Fire, Loss by Accident and Loss by Death. In the hand held aloft is a green torch signifying safety. The entire color scheme is cream white and darker shades of buff with green. The booth is the second largest in size in the entire insurance division, having a total of 2,500 square feet of exhibit space. The back walls are used for book case spaces and displays of the insurance companies entered under the Collective Insurance Exhibit; from here competent attendants distribute literature and souvenirs of the seventy various insurance companies. The floor space is devoted to a safety exhibit collected, assembled and maintained by Safety Engineering, "the magazine of safety.

Whereas it naturally would be impossible in the floor space allotted to show all phases of safety, this exhibit undoubtedly embraces a more general aspect of the subject than does any other in the building. It includes, among other things, a 3,200 pound grinding machine exhibited by the Norton Company, Worcester, Mass., guarded in accordance with accepted standards and provided with adequate exhaust facilities; a complete Draeger Rescue Apparatus and Pulmotors by the Draeger Oxygen Rescue Apparatus Company of Pittsburg, Pennsylvania; Pyrene, Badger and Babcock fire extinguishers and fire engines; numerous patented fire fighting apparatus of all sorts all bearing the label of the Underwriters' Laboratories, having been tested and found efficient; patented tools and safety devices applying to different industries. Notable ones are the Safety Set Screw Exhibit submitted by the Allen Company, safety goggles, Narcosis rescue apparatus and first aid kits of all descriptions. One particular feature which is attracting a great deal of attention is a wire glass

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window furnished by the Pennsylvania Wire Glass Company, taken from the Western Electric Company's plant in San Francisco, which stood the heat of the great conflagration in 1906. Mr. Freitag, the well known fire protection expert, has estimated that this window withstood a temperature of 2,000 degrees Fahrenheit for a considerable length of time during the fire. It is also interesting to note that men remained in the building where this glass was used throughout the period of fire and that it was the only building intact for many blocks in any direction after the conflagration. The window is displayed just as it was taken from the building and is, as stated, a constant source of interest to visitors, especially San Franciscans, to whom it undoubtedly recalls some of the hardships which the citizens of that metropolis underwent during the frightful period of April 18-20, 1906. Another exhibit of interest is a safety carboy inclinator by Eimer & Amend, New York.

To add interest and break the monotony of booth sight-seeing, the co-exhibitors have installed three exceptionally interesting electric mechanical models. The model in the west end of the major section of the booth was designed and executed by Osborne and the mechanical lighting effects by W. E. Cutler of San Francisco. It represents a bird's-eye view of San Francisco in ruins, after the three days' conflagration of April 18, 19 and 20, 1906. The model is taken from the photograph of Lawrence and represents San Francisco as seen from a baloon 1,500 feet above Knob Hill. It is a most remarkable model in that persons familiar with the streets and contours of San Francisco could readily place any section. The size of this model is 10 feet long, 6 feet deep, and 12 feet high.

The second model near the center of the booth represents the loss by fire each year in the United States—165,000 buildings burned, or one about every 4 minutes. This model is most realistic. It has a stage setting. The curtain goes up! One sees a peaceful little farm house as it would appear at night. Fire breaks out in the lower floor, gradually creeps to the second, the third, and out through the roof. Then the fire bell rings, all the occupants carry out their household goods, and the curtain descends.

The third model, in the front part of the booth, is a tax mill, representing the unjust taxation of insurance companies by prejudiced, ignorant and corrupt legislation, drawing attention to the fact that this form of taxation is an indirect picking of the pockets of the insuring public; the insurance companies must, of necessity, add this taxation to the premium incomes and the purchaser must pay the bill.

The rest room contains 750 square feet and is fully equipped for the convenience of visitors. It has adequate and comfortable chairs, tables, writing desks and a full quota of insurance and safety periodicals. In this rest room a visitor can meet or get in communication with practically every insurance man or safety man who lives or is visiting in San Francisco. In this room also is distributed a daily paper devoted to insurance, safety and fire prevention events, published by Insurance Field Publishing Company within the Exposition Grounds, the first and only daily insurance paper in the world.

To sum up, the visitor after having spent a few hours reviewing this exhibit from all its angles, instinctively departs feeling that insurance in all its branches is, in truth, one of the fundamental pillars supporting our economic and social structure.

UNSAFE ELECTRIC WIRES.

Some of the electric wires in one of the stories of a warehouse of the Northern Furniture Company, Sheboygan, Wis., that had been down in a few places, were nailed to the joists. In other places they were tied up with strings. That did not seem to be safe, and a workman so reported to the safety committee. The committee reported that it was a temporary arrangement, and that it had been attended to. The report of the workman was appreciated, nevertheless.

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NATIONAL SAFETY COUNCIL

IN THIS DEPARTMENT ARE ARTICLES AND NEWS REPORTS CONCERNING THE NATIONAL SAFETY COUNCIL AND ITS LOCAL COUNCILS, FURNISHED EXCLUSIVELY TO "SAFETY ENGINEERING"

FOURTH ANNUAL MEETING AND CONGRESS OF THE NATIONAL SAFETY COUNCIL

THE Fourth Annual meeting and Congress of the National Safety Council will be held, in accordance with the provisions of the by-laws, October 19 to 21, 1915, inclusive, at the Bellevue-Stratford Hotel, Philadelphia.

Several months ago the Executive Committee of the Council appointed the various committees to take charge of the preparations, and much work already has been done.

The Bellevue-Stratford Hotel has agreed to put at the disposal of the Council during the week of October 17 to 23 the entire Ball Room floor of the hotel. These accommodations include the large Ball Room, having a seating capacity of 1,500, the Red Room for the Council's exhibit, and one-half dozen other large and commodious rooms for special meetings. The accommodations will be ampler and more suitable than those provided for the Congress last year.

The important feature of the Congress this year will be the proposed Sectional Round Table meeting, viz: meetings of groups of persons interested in accident prevention problems of specific character, or of special industries. A review of the program which follows indicates that the Congress will deal with up-to-date and practical problems in safety, and the sectional meetings will provide an opportunity for everyone interested in the specific safety problems of his own industry to have an opportunity to hear safety experts from various parts of the country discuss the problems he is most interested in. It is to be noted also that there will be only one General Session and one General Round Table Meeting.

Committees on Arrangements, including hotel accommodations, banquet, Reception Committee, Printing and Badges Committee, Registration and Information, and Publicity have been appointed. Mr. C. W. Price, director of exhibits, has already made considerable preparation for a new and interesting safety exhibit.

In the September issue of SAFETY ENGINEERING a full and complete copy of the program will be published, including the names of all of the speakers, the final arrangements for the banquet, and the entire program for entertainment. In the meantime, SAFETY ENGINEERING presents to its readers a skeleton of the program, which will no doubt arouse considerable interest and enable the members of the Council and others to set aside October 19 to 21 for this important annual national event.

The Council now has over 3,500 representatives residing in every State of the Union except three, and arrangements are being made to accommodate 2,500 people at this Congress.

FOURTH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL, Bellevue-Stratford Hotel, Philadelphia, October 19, 20 and 21, 1915.

PROGRAM COMMITTEE.—W. H. Cameron, chairman; Dr. C. B. Connelly, H. W. Forster, Lew R. Palmer, Dr. F. D. Patterson.

COMMITTEE ON ARRANGEMENTS.—Sub-Committees on Registration and Information, Hotel

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Accommodations and Arrangements for Banquet, Reception Committee, Publicity Committee, Entertainment Committee, Printing and Badges, Press Agent.

COMMITTEE ON EXHIBITS.—C. W. Price, Director of Exhibits.

SAFETY EXHIBIT.—Located in the Red Room on the Ball Room Floor (the entire floor has been reserved for the Congress). An interesting exhibit prepared under the direction of Mr. C. W. Price, Director of Exhibits, of which the following are a few of the items:

1.—National Safety Council's activities, including graphic charts, showing membership, distribution of bulletins, etc.
2.—Twelve to fifteen Bulletin Boards.
3.—Display of important signs in various languages.
4.—American Seating Company's blackboard chart.
5.—Brief quotations from Safety men expressing vital points in safety.
6.—Display of Monthly Shop Bulletins published by various companies.
7.—Large graphic chart in colors showing reductions in accidents.
8.—Exhibit of Safety work done in schools.
9.—Boy Scout Safety Work.
10.—Display of "Sure Pop" books with original drawings.
11.—Graphic charts, one from each State, showing educational work done.
12.—Sample Rule Books.
13.—Display of samples of prizes, tokens, etc., used to promote Safety.
14.—Shop Lighting showing actual installation.
15.—Public Safety Exhibit.
16.—Chart showing Causes of Accidents.
17.—Stereopticon and moving pictures showing safeguards.
18.—First Aid Room complete, including sample First Aid boxes.
19.—Complete exhibit Eye Protection.
20.—200 to 500 carefully selected photographs of safeguards.
21.—Two dozen photographs of workmen's Safety Committees.
22.—Chart showing sectional bulletins.

Members are requested to view the exhibit before and after the Sectional Meetings. Arrangements have been made to keep the Exhibit Room open, with attendants in charge, from 8 a. m. to 10 p. m. each day of the Congress.

MONDAY, OCTOBER 18, 1915.—10 a. m. to 4 p. m.

Special Committee Meetings for conferences and making final preparations for Opening of Congress.

Accident Statistics Committee.
Industrial Hygiene Committee.
Standardization Committee.
Danger Signs Committee.
Executive Committee.
Resolutions Committee.
Program Committee.
Arrangements Committee.
Sectional Committees.
Officers and Committees of Local Councils.
Luncheon for all Committees at 1 p. m.

TUESDAY, OCTOBER 19, 1915.—Registration of Members, Representatives of Members and Visitors, 9 a. m. to 10 a. m.

Annual Meeting of Members, 10 a. m. to 12 Noon. R. W. Campbell, President, Presiding Officer.

Order of Business:

1. Prayer.
2. Address of Welcome.
3. Response by the President.
4. Roll Call, or other ascertainment of members present.
5. President's address.
6. Reading and disposal of any unapproved Minutes.
7. Reports of Officers and Committees:
   Secretary and Treasurer.
   Executive Committee.
   Finance Committee.
   Program Committee.
   Resolutions Committee.
   Standardization of Safety Devices Committee.
   Industrial Hygiene Committee.
   Accident Statistics Committee.
   Danger Signs Committee.
   Fire Prevention Committee.
   Nominating Committee.
8. Election of Directors.
9. Unfinished Business.
10. New Business.

Note: Every member should designate one of his representatives in attendance to cast his entire vote.

General Session, 2 p. m. to 5 p. m. Hon. John Price Jackson, Chairman, Commissioner, Department of Labor and Industry, Harrisburg, Pa.

Introductory Remarks by Chairman.

Address—"The Development of the Safety Idea."

Address—"Public Safety and the Railroads."

Address—"Safety as an Indispensable Part of an Efficient Manufacturing Organization."

Address—"The Manufacturing Association and Its Responsibility to the Accident Prevention Movement."

Address—"The Growing Importance of the 'Visiting Nurse' in Industrial Welfare Work."

Address—"Standardization of Safeguards."

Moving Pictures, 5 p. m. to 6. p. m.

Regular meeting of Directors for Election of Executive Committee, 5 p. m. to 6 p. m.

WEDNESDAY, OCTOBER 20, 1915. Sectional Round Table Meeting, (i. e., Meeting of Groups of persons interested in Accident Prevention Problems of specific character or of special industries), 9:30 a. m. to 12 Noon.

Steam Railroad Sectional Meeting.
Textile Sectional Meeting.
Public Utilities Sectional Meeting.
Cement Sectional Meeting.
Paper Manufacturers Sectional Meeting.
Mining Sectional Meeting.
Laundry Sectional Meeting.
Sectional Meetings, 2 p. m. to 5 p. m.

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Physical Examination of Employes Sectional Meeting.

Machine and Tool Safeguards Sectional Meeting. (Including design and manufacturing).

Banquet (Informal), 7 p. m.

THURSDAY, OCTOBER 21, 1915.—Sectional Meetings, 9:30 a. m. to 12 Noon.

Foundries Sectional Meeting.

Woodworking Sectional Meeting.

General Round Table Discussion, 2 p. m. to 5 p. m. C. W. Price, Assistant to the Industrial Commission of Wisconsin, Chairman.

General Meeting of All Sections to discuss: "How to Educate the Workman."

This meeting will be of special interest to every man who has gotten by guards, and sees that the Safety game is largely one of education—getting the workmen with you. All of the old pioneers in the movement will be there to give their experience—but they will be limited to three minutes apiece. Everybody will have a chance to talk and ask questions. A Round Table is a place where everybody gets into the game. Don't miss the big game.

Moving pictures, 5 to 6 p. m.

ROCHESTER COUNCIL.

EXECUTIVE Committee meeting, June 23, 11 members present. President J. A. Robertson brought up the matter of the recent slight increase in the dues for membership in the National Safety Council, and explained the reasons for the increase.

The resignation of Dr. E. H. Wolcott as a member of the executive committee was announced; and it was resolved that Dr. Harold H. Baker, medical examiner of the Bausch & Lomb Optical Company, should be asked to succeed Dr. Wolcott.

It was agreed that discussion of financial matters, which also involve the raising of $600 for organization of the Junior Safety Council, should be postponed until September.

SUMMER SAFETY CAMPAIGN.—The executive committee has under consideration a suggestion made by Secretary W. H. Cameron of the National Safety Council, that a Summer Safety Campaign be conducted in Rochester by the exhibition of pictorial bulletins and illustrations of the cases of accidents and their prevention, in the downtown store windows. It was resolved that no meetings be held in July and August, unless President Robertson saw fit to call them.

J. A. ROBERTSON
President, Rochester Council

PRESIDENT ROBERTSON.—The Rochester Council was organized on May 6, 1915, and has accomplished excellent results under the presidency of J. A. Robertson. A number of successful public rallies have been held. The Committee on Organization has laid out a complete plan for safety organizations in large, small and medium-size plants. The Committee on Standardization of Safeguards has made a complete study of the requirements for the industries in Rochester. The Public Accident Committee held a successful rally in Convention Hall on February 23, 1915, and the committee is still working in conjunction with the public safety commissioner, the police department and the fire department of the city. The best work of the Rochester Council has been accomplished by the Committee on Education in Schools and Homes. A Junior Safety Council of boys clubs in grammar schools

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has been organized, the safety committee consisting of six boys selected from the boys' club. The chairmen of these committees are to meet monthly and in the fall are to organize a Junior Safety Council conducted entirely by the boys. A meeting was held a few weeks ago and the chairman of each grammar school reported the accidents in the school and the means for preventing them. "It was one of the most interesting meetings I have ever attended," President Robertson said.

It gives SAFETY ENGINEERING much pleasure to present in this number a portrait of the president of the Rochester Council. Mr. Robertson's experience in safety work began in 1911 when the Eastman Kodak Company decided to take active steps in a safety campaign. He was appointed chairman of the safety committee and has continued to hold that office. In 1910, the Kodak Company had 412 accidents in its works. In 1914, the number was only 158. Four years of safety work has reduced the number of accidents per 1,000 employes from 109.72 to 27.41. The percentage of reduction of machine accidents has been 78.14 per cent. The reduction of general accidents has been 73.19 per cent. The percentage of reduction of total accidents has been 75.02 per cent.

BOSTON COUNCIL.

MEETING held in Huntington Hall, Massachusetts Institute of Technology, Tuesday, June 22, at 7:45 p. m. J. M. Larkin, secretary, presided. Approximately 100 members were present.

STANDARDIZATION.—The chairman introduced the speaker of the evening, Dudley M. Holman, chairman of the Joint Committee of Standards for the Industrial Accident Board and State Board of Labor and Industries, and said that the Standardization Committee of the Boston Safety Society, together with other organizations, had been called upon in an advisory capacity, to discuss the question of standards. Mr. Holman reviewed the establishment of the Joint Board by the Massachusetts Legislature and the plan which it proposes to adopt. He pointed out, with regard to accidents in Massachusetts, the following interesting facts:

There are 500 deaths annually.

Four thousand workmen are idle every minute due to accidents.

Approximate amount of wages lost daily, $10,000.

Approximate amount of wages lost annually, $3,000,000.

This constitutes an economic loss of $6,000,000 or $7,000,000.

Mr. Holman said that the opinion of many foremen in the various industries had been solicited in the compilation of the standards.

The following changes were adopted for the proposed standards:

Recommendation A: Time limit changed to 2 years.

Recommendations B. C. D and E: Time limit placed at 1 year.

Recommendations F to Q, inclusive: Time limit placed at 6 months.

At the close of Mr. Holman's remarks, the meeting was open for general discussion. The discussion:

Mr. Harden: Are wooden guards acceptable in combustible buildings?

Mr. Holman: No.

Capt. White: Where belting goes through a floor, is it necessary that a steel guard be placed around same?

Mr. Holman: No.

It was here pointed out that the mention of prohibiting the use of wooden guards in fire resistive buildings in Recommendation A should be changed to read: "Wooden guards, especially if oil soaked, increase fire hazard and are prohibited by the fire underwriters in *any* buildings.

Mr. Harden said that he favored the yellow background for the distinguishing mark for emergency stopping device, the mark to be preferably blue.

Mr. Haines said that, in his opinion, the distinguishing mark should contain explicit instructions to the workmen as to the operation of the stopping device.

Mr. Van Doren: I should like to ask why the committee set the distance for stop stations at 100 feet?

Mr. Holman: The standard for the State of Wisconsin, which is 50 feet, was very carefully considered by the

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DR. RICHARD C. MACLAURIN
President, Boston Council.

joint committee, and it was deemed advisable to double this distance, in order that the inconvenience to the manufacturer might be considerably lessened and further, in their opinion the distance was considered sufficient.

Capt. White: I should like to ask how it is proposed that stops should be safeguarded?

Mr. Beyer: A box with a glass front similar to a fire alarm box might be used for this safeguard.

Mr. Scott said that if the recommendations contained in the joint board standards were to be enforced by the Commonwealth, it would mean an expenditure of $100,000 to his company, and that in his opinion, careful consideration should be given to the question of the standards before their final adoption.

Mr. Wilkinson: I should like to ask if the joint board proposes the testing of stop devices?

Mr. Holman: In my opinion the testing should be done under the direction of the company.

Mr. Cole: Would not signalling the engineer to shut down power be a sufficient safeguard, if the proper drills were required?

Mr. Holman: No.

Mr. Holman said that the joint board needed the employers' co-operation, and that there would undoubtedly be included in the standards, a clause giving to the employer the right of appeal to the board to have certain unusual conditions waived.

Capt. White said that if the standards were adopted and enforced, the companies adhering to these standards should receive from the insurance companies lower rates.

Mr. Holman said that compensation insurance in Massachusetts is from 40 per cent to 60 per cent less than in any other State, and that if the rates were to be further reduced, the situation would become an extremely dangerous one, but that there would be, of course, a merit system adopted, and debits and credits allowed the employers for the carrying out of the standards.

The secretary said that the society would omit the regular monthly meetings during the summer months, and that the next meeting would probably be in October, when it is hoped that there will be a very substantial increase in membership, due to the activity of the chairman of the membership committee, Herbert W. Moses.

PRESIDENT MACLAURIN.—Richard Cockburn Maclaurin, president of the Boston Council, is also president of the Massachusetts Institute of Technology. Under his guidance the institute found its way out of troubled waters to its present position of security. He was born in Edinburgh in 1870; his early boyhood was spent in New Zealand whence he returned to England to complete his preliminary education in English schools. In 1892 he entered the University of Cambridge where he held a foundation scholarship in St. John's College. He took two degrees at Cambridge, bachelor of arts and master of arts, the thesis work for the latter being

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most advanced mathematics. He received the Smith prize for excellence in mathematics. Upon his graduation he was elected Fellow of St. John's College. Dr. Maclaurin next spent ten months in the United States and Canada (1896-97) studying and visiting educational institutions, and spending much time at McGill, Toronto and Leland Stanford Universities. Returning to England he reentered Cambridge, this time to study law, and was awarded the McMahon Law Studentship, the most highly valued of its kind in the university.

In 1898 Dr. Maclaurin was appointed professor of mathematics in the University of New Zealand, became a trustee of the university and took an active part in the organization of technical education in the colony. In 1903 he became dean of the faculty of law in the university, which office he held for four years. In 1907 he was invited to take the chair of mathematical physics at Columbia University, New York, and a year later was made head of the department of physics. In 1898 the degree of doctor of science was conferred upon him by Cambridge University for his researches in pure science and again in 1904 he was honored with the degree doctor of laws by the same university for his achievements in the study of law. November 23, 1908, Dr. Maclaurin was appointed by the Corporation of Technology to be president, and from that day he has been steadily working for the institute with that success which has been so often set forth by announcements of substantial aid to it and its departments.

YOUNGSTOWN COUNCIL.

MEETING June 15, 27 members present. President D. R. Kennedy in the chair. A proposed revision of the constitution and bylaws of the Youngstown council was presented to the meeting, and agreed to unanimously.

Arrangements were made to provide for the holding of an occasional meeting of the Youngstown Council in New Castle or Sharon, for the benefit of members residing in these centers.

FLYING SQUADRONS.—A special committee of three was appointed to make arrangements for the organization of "Flying Squadrons." The duties of the "squadrons" will be to visit several plants and speak on safety to workmen, safety committees and superintendents.

ACCIDENT REDUCTION IN OHIO.—Victor T. Noonan, safety director of the Industrial Commission of Ohio, spoke of his past work and future plans for the reduction of accidents throughout Ohio. He said that he had found that the best way is to get out personally among the plants, give talks, make inspections, and suggest methods of safeguarding. He told how the State finance committee had approved an appropriation of $10,000 for safety work, and that Governor F. B. Willis had become a member of the National Safety Council. During May, Mr. Noonan said, he visited 19 factories, and they all shut down for half an hour in order that he could talk to the men. He also talked in the schools on safety.

GIRLS' HANDS.—Continuing, Mr. Noonan told his audience that in one factory he found that a number of accidents to girls' hands were caused because the girls were in the habit of placing their hands in the machine while it was in operation and of removing pieces of material from the machine. This habit was formed because the foreman, in passing machines, did it. He had thus set the example to the girls. In another factory, girl-employes were careless in the way they wore their hair. In speaking to these girls, Mr. Noonan, related an accident that happened to a girl who was employed in the same kind of a factory. Her hair became caught in the machinery, and her scalp was torn off. The manager of the factory where Mr. Noonan gave this talk had not heretofore been interested in safety work, although his foreman had asked him for permission to put up safety bulletin boards and install safety devices. Immediately after Mr. Noonan's talk, the manager took some National Safety Council bulletins, which had been lying on his desk, and tacked them up in the factory. He told the foreman to get safety bulletin boards made, and to "go ahead" with safety work.

STATE SAFETY EXPOSITION.—Mr. Noonan concluded by saying that the

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Annual State Safety Exposition would be held in Cleveland on January 22 to 30, 1916, in the Central Armory Building, and that Ohio's work in safety had attracted attention throughout the United States.

PSYCHOLOGY OF ACCIDENTS.—It was agreed that the arrangements committee should nominate some one to read a short paper on the psychology of accidents; and that a discussion upon this paper should be held. One of the members gave it as his opinion that after the European war is over, a number of men who have served in the campaign will secure work in the mills and factories of the United States; and that as these men will have become imbued with the idea that it is courageous to be reckless, a large increase in accidents may result. The member indicated that this question be discussed in connection with the psychology of accidents, and steps taken to avoid the contingency he had outlined.

FORMULA WRONG, TYPOGRAPHICALLY.

Referring to the discussion on pages 543 and 544 of the June number of SAFETY ENGINEERING, William H. Doolittle inquires whether there was not some mistake in reporting the formula for calculating the safe speeds of abrasive wheels proposed by Mr. Talpey, viz:

$$R = \frac{125}{\pi D}$$

R = revolutions per minute.
S = surface speed in feet per minute.
D = diameter of wheel in inches.

The correct formula:

$$R = \frac{12\,S}{\pi D}$$

R = revolutions per minute.
S = surface speed in feet per minute.
$\pi = 3.1416$.
D = diameter of wheel in inches.

The value of S should be obtained from the manufacturer, and varies with the kind of wheel and the use to which it is to be put.

SAFETY PRINCIPLES IN SMELTING WORKS.

By R. S. Hawley, Professor of Mechanical Engineering, Colorado School of Mines.

"Safety First" principles have been put into successful operation at the International Smelter at Tooele, Utah. A movement was started about a year ago looking toward the betterment of working conditions. A committee composed of six heads of departments is appointed by the management. The chairman of this committee is permanent, but the personnel of the committee is changed periodically, to include all of department heads of the plant. Meetings are held weekly at which points of danger about the plant and methods of protection from the same are discussed. Inspections are made and investigations of accidents are carefully carried out with the idea always of future prevention. The committee makes recommendations to the management for safety devices. These recommendations are practically always adopted, though sometimes with modifications, and the protective devices are installed as soon as feasible. These devices include guards around moving machinery, hoods over exposed gears and mechanisms, ventilating flues to conduct poisonous gases from the furnaces, and such other devices as the conditions may warrant.

Contrary to the opinions of many, the installation of safety devices does not make the workman less cautious. The device itself constantlty before the eyes is perhaps the most efficient "Safety First" sign that could be devised. It serves the double purpose of protecting the workman and instilling in him the idea of caution in his work.

The success of this movement is best shown by the results. Since its beginning the frequency of accidents has decreased fully 50 per cent and the saving in money to the company has already amounted to thousands of dollars. Naturally, the management is very enthusiastic over the scheme and is cooperating in every practicable way to broaden its scope.

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PROPER PROTECTION AGAINST SPLASHES OF MOLTEN METAL

By F. W. King.

INNUMERABLE eyes have been lost and injured by splashes of molten babbitt, lead, steel, etc., and great advance has been made in the production of lenses to eliminate this danger. Few

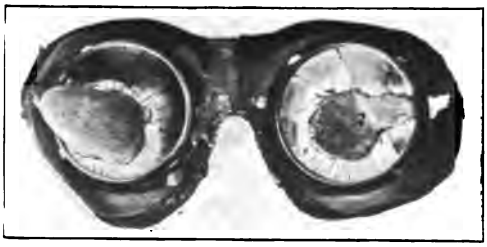

Fig. 1.

know that special lenses are required for this purpose.

Ordinary glass, such as comes in cheap goggles, is, if anything, more dangerous than no protection at all, on account of the great danger from broken and jagged pieces of glass that may cut

Fig. 2.

through the eye ball and destroy the vision.

Colorless "white" lenses are not recommended for this work, but, if they are to be used, they should be of the "monogram" type, as they have been made to withstand, to the highest degree, strain from hot metal, and they will be efficient protection against hot babbitt or lead, although not against a splash of steel as occurs around the Bessemer in pouring steel.

In a series of experiments made by the writer in a very large steel plant in South Chicago, in the presence of reliable witnesses, the test was made in the Bessemer department, as shown by the accompanying illustrations.

Fig. 1 shows a type of protector, formerly used in the department, which contains the best "white" lens obtainable 18 months ago. Molten steel was poured and splashed on the lenses from a height of about three feet. The hot metal went through the wire gauze in several places and a large piece remained stuck to each lens. One of the latter withstood the strain fairly well, although many small particles of glass

Fig. 3.

were thrown out of the opposite side of the lens, as shown in Fig. 2. The other lens afforded no protection worthy of the name, as the metal shot right through it. Such goggles are not recommended.

Fig. 3 shows a standardized goggle,

Fig. 4.

with the very latest monogram form of "white" lenses. They were given the same test. The metal stuck to the lenses but fell off before it could be photographed.

Fig. 4 shows a reverse view, and it

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will be seen that the metal did not penetrate the lenses, although chips flew from the inner side. In a case of this kind the operator's eyes would have been

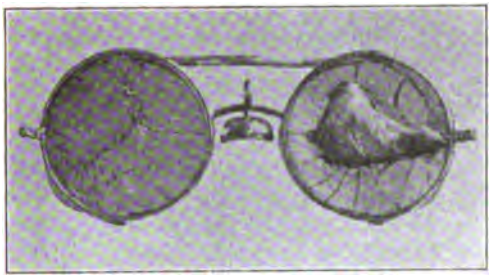

Fig. 5.

saved, but the cornea would have been cut by small pieces of glass.

The inner surface of both lenses was ragged and rough and the finger would be cut by passing it over this surface.

Fig. 5 shows the present development of glass for all hot metal conditions where danger from splash exists. The color is the well known Akopos, and absorbs the ultra violet rays and cuts down the infra red so no danger or strain is apparent or possible up to about 3,500 degrees F. This slight color, or tint, does not cut down illumination to any appreciable extent, so the operators can

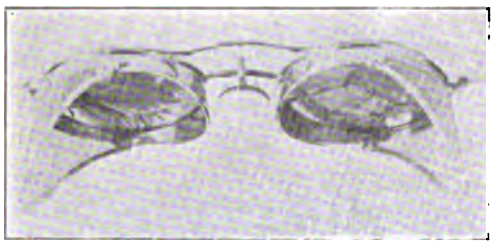

Fig. 6.

see plainly wherever they may be. This lens enables the temperature to be seen quite distinctly and is a decided relief to wear.

Fig. 6 shows the very remarkable characteristic of the new lens. The pieces of glass do not fly from the inside of the lenses, and after being broken by the terrific heat of the molten steel, the pieces all hang together, are remelted and welded together again so the inside of the lenses is nearly as smooth and even as before the test. No other lens that has ever come under the writer's attention possesses this very unusual feature, and it is, of course, an ideal one for use in conditions mentioned.

This test was made only to prove the merit of the lenses and in no way the frames. For work around a blast furnace no all metal frame can be used on account of the intense heat. For such conditions a mask of a special type should be used, with Akopos lenses.

"SAFETY FIRST" IN SHIPBUILDING.

The "Safety First" campaign had its real beginning last July, and since that time it has been pushed most energetically, said the *Fore River Log*, the new publication of the Fore River Shipbuilding Company, Quincy, Mass. It is interesting to note that during the second three months of this campaign there was a reduction of twenty per cent. in the number of accidents over the first three months period. This, it is believed, shows that the men themselves are taking an interest in the work and are cooperating with the company in its effort to safeguard them wherever possible. These efforts will be continued, and even better results are looked for in the future. It is, however, true that a large proportion of the accidents which occur in a plant like ours are due to the carelessness of fellow-workmen, and while the company may expend large sums of money in safeguarding its machines and in installing other safety appliances, it can hope for the best results only with the continuous co-operation of the men.

There has been a committee appointed every three months for each department, which consists of the foreman and two other employes. Weekly meetings are held and safety for their respective departments is considered. Workmen are urged to report any unsafe conditions to their shop committee.

As a part of the educational side of the safety first campaign the company arranged two free entertainments, hiring a local theater. The programme consisted of music, moving picture reels and lantern slides.

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ACCIDENT PREVENTION ACTIVITIES, 1914

AETNA LIFE INSURANCE COMPANY.

DURING the year 1914 the Aetna Life Insurance Company made 36,243 inspections classified as follows:

Factories, mercantile establishments, construction work	14,692
Elevators	19,460
Sprinkler systems, fly wheels, etc.	2,091
	36,243

Recommendations to the number of 107,578 for safety improvements were made, and of these 57,559 were carried out. Some of the improvements made are as follows:

Guarding dangerous belts and belt holes	9,583
Guarding dangerous gears	8,145
Guarding dangerous pulleys	6,046
Guarding dangerous protruding set screws	4,784
Guarding dangerous shafting	3,069
Guarding dangerous elevator shafting and entrances	1,690
Renewing elevator cables	1,149

The Aetna field inspection staff comprises a force of more than 100 men especially well-trained and qualified for safety work. The results achieved during the year in the way of eliminating many dangerous industrial hazards in plants and operations inspected and the manifest growing interest among employers in general were both gratifying and encouraging.

The Aetna has made special efforts to secure the active co-operation of the employer in accident prevention work, believing that if the responsible heads of concerns become interested, the elimination of dangerous conditions will follow as a matter of course. To that end each inspector, when visiting a plant, if he can possibly do so, goes over the conditions, as he finds them, with the owner or general manager. The inspector is thus able to explain and offer suggestions covering any matters that might not perhaps be so clearly understood from the report. The inspector also endeavors to prevail on the employer to establish a safety committee, composed of workmen in his plant, and advises with him as to the best means of establishing and continuing such a committee. These safety committees have been found to be a very considerable factor in eliminating dangerous conditions and preventing accidents. Through them the employes get more than ordinarily interested in their own safety and welfare by reason of being able to take an active and recognized part in the work. The result is that there comes to exist a better feeling between the employer and the employe, owing to the co-operation with each other for their mutual benefit. As an incentive to the appointment of a safety committee the Aetna has prepared a blank inspection report form, especially adapted for the committee work, and a supply of these is furnished to the employer in order that he may start and try out the plan. Once tried, it is very seldom discontinued.

The Aetna thinks that there cannot be too much said and written for the purpose of spreading the gospel of "Safety First." On numerous occasions Aetna inspectors have delivered talks in shops on Accident Prevention. Such talks have been helpful in arousing the interest of the workmen, as they like to hear from a man who has been around among other plants just what they are doing in the line of safety work in those plants. The information which the inspector is able to give stimulates in them a desire to have the conditions under which they work equally as good.

In educating the general public in the ways of accident prevention, the Aetna is in hearty accord, and in 1914, as in previous years, availed itself of the opportunities presented of preparing and showing an accident prevention exhibit at safety and welfare expositions held in various cities. The exhibit comprises safety appliances of various kinds, photographs illustrating

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how machinery and dangerous places are and can be safely protected, broken and defective parts removed on the recommendations of inspectors and Aetna publications treating of the subject of accident prevention. These exhibits have always received a great deal of attention.

At the Panama-Pacific Exposition, and also at the Panama-California Exposition, now being held in San Francisco and San Diego, respectively, the Aetna has comprehensive safety exhibits, showing in addition to the usual safety appliances, photographs, safety literature, etc., a good many different kinds of machines in actual operation, each guarded according to the best standards of present-day protection, and a factory model showing in one half unsafe conditions, and in the other half everything completely safeguarded.

SCHEDULE RATING AND ACCIDENT PREVENTION.

By Leon S. Senior.

From paper read at the annual meeting of the Casualty Actuarial and Statistical Society.

Aside from the effect which schedule rating has produced upon premium rates for compensation insurance, the important question, from a humanitarian point of view, is whether the system has contributed to any degree in reducing the number and severity of accidents in industrial establishments.

The vindication of the system would be complete, if it could be demonstrated by facts and figures that accidents, preventable by the installation of standard equipment, had been avoided through the adoption of measures for the protection of the workers. While figures demonstrating the beneficence of the system are not available as yet, in these early days of compensation, information received from all parts of the State indicates that the employers are taking a lively interest in schedule rating; that they are eager to learn and to put into effect methods which will guard the operation of dangerous equipment and result in the prevention of unnecessary accidents.

Evidence is not wanting that the system has given a tremendous impulse to the propaganda of safety ideas, to the organization of safety committees and to the exercise of greater care and caution in the operation of dangerous equipment.

Safety engineering, as a profession, has become of real importance with the adoption of compensation laws and schedule rating systems. Employers, faced by the problem of high rates, welcome the opportunity to secure reductions through compliance with reasonable requirements for the protection of employes.

To the close observers of conditions there is no doubt left that employers are interested and that they recognize the possibilities that may develop as a result of a perfected system of schedule rating.

As soon as the reports of the experience for the first compensation year have been tabulated, sufficient facts may be marshalled to indicate the effect of schedule rating, not only on premiums, but, what is more important, on the accidents and losses sustained in the manufacturing plants subjected to schedule rating.

HEART OF SAFETY PROBLEM.

It is not what employers say or think about safety matters that counts most, but rather what they do to provide for their employes the greatest degree of protection against injury, said the N. F. A. *Safety Bulletin*. Reading of safety bulletins alone will not make for safety, although it should stimulate action in that direction; mere organization of safety committees in foundries and shops will not eliminate accidents although such organized efforts provide effective machinery for the purpose. To teach men how to recognize hazards in employment and how to guard themselves against them; to provide for workmen suitable protective devices and to take every reasonable step for the safeguarding of apparatus and premises: these are the things that go to the heart of the safety problem.

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A PLAY IN FOUR ACTS.

(*Scene: Any shop in the United States*)

Harry and John were assigned the job of repairing a freight car truck, on which considerable chipping was necessary. The foreman, imbued with the "Safety First" idea and with the feeling of personal responsibility for the men under him, handed Harry a pair of goggles and urged him to use them.

Harry was a good workman, sober and steady, but he had not realized the importance of safety devices, and he rather scoffed at the idea that his employer could have any interest in him, outside of getting as much work out of him as possible. He accepted the goggles from the foreman as a matter of course, but, instead of using them to protect his eyes, he decorated his forehead with them.

A few moments later the inevitable happened. A chip rebounded from the casting and struck Harry directly in his right eye. He was taken immediately to the company's hospital, where expert surgical attention was given, but, in spite of all efforts, the eye was lost.

In the last picture Harry is seen emerging from the hospital, with one

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of his eyes blinded for life and the other affected seriously, due to the nerve shock. He is from now on only a 50 per cent efficient man. His chances for promotion to a more responsible position are gone. It would have been otherwise had he listened to his foreman's advice and heeded the precaution to wear goggles while his eyes were still good. This is not fiction, but a story from real life, and it emphasizes the fact that all must be educated out of instinctive recklessness into intuitive caution.

CUTTING RIVET HEADS.

The two accompanying pictures need little elaboration. Imagine what would happen to the head of either of the men, standing at the left, if the head of a rivet should hit it. As shown in the upper picture, nothing has been done to prevent a hit, and, as their heads are directly in the line of flight of a rivet head, a serious accident would undoubtedly result if the precaution, as shown in the lower picture, to arrest the flight of the stabled head had not been taken. The old broom used for the purpose was effective, offering a sufficient cushion to prevent the head from rebounding and striking either of the men engaged in cutting the rivets.

SAFETY INSPECTIONS.

Submitting his report at the annual convention of the National Metal Trades Association, Commissioner John D. Hibbard directed attention to the work of the committee on safety and sanitation and to the efforts of the safety inspector to be of assistance.

"During the year," he said, "I have had occasion to answer a few letters from our members who seem to feel that this inspection was, to say the least, superfluous. To each of these I have endeavored to point out that, regardless of the inspection insisted upon by the State and that usual with the accident indemnity companies, both of which may be competent, our own inspection was still valuable, and that most of our members, including some of the largest and best managed institutions of this country, have found that the suggestions made by our inspector are of real, practical benefit and assistance to them.

"Our inspection is your own inspection, and is made with the sole idea of being of the greatest possible assistance to you. We endeavor to call your attention not only to the things which have caused expensive and unfortunate trouble in other places, but also to try to suggest the best, most practical and most economical way of meeting the particular difficulty."

NARROW WHITE WAY.

The decision of the Safety First Society of New York City is that the best way to cross Broadway is to walk along a white line, six inches in width, from curb to curb. At the ends of the line are to be signs, reading "Safety Zone: Cross Street Here." The slogan of the campaign to direct New Yorkers to walk the white line is: "Cross the streets at the crossings."

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"THE MAN ON THE JOB"

Safety in Electric Light, Power and Gas Industries

Other articles on this subject will appear in a later number.

177 SOME DEVICES TO PROTECT LIFE AND PROPERTY.—In the 800 words allotted it is obviously impossible to cover all phases of the "Safety First" situation in any company and I shall therefore outline but briefly some of the devices in use to guard life and property as well as some of the means taken to educate the men up to the "Safety First idea" in the Brooklyn Edison Company.

The purchasing Department was the first in the Edison Company of Brooklyn to organize a safety committee, consisting of 12 men appointed each month under the direction of H. F. Frasse, the purchasing agent, which committee has led to the elimination of many dangerous elements so that work is at a higher state of efficiency than before.

Many manufacturers shipped material so that protruding nails were left on the inner surfaces of boxes and barrels, lacerating the hands of those who unpacked them. Cable-makers sent cable on reels having loose metal straps that were a constant menace and tore the clothing and injured the truckmen. These and many other dangerous conditions have been removed by the intelligent work of the safety committee. To show the vast improvement in working conditions, it may be said that during the month immediately following the inauguration of the safety committee, over 12,000 packages, consisting of all manner of boxes, barrels, etc., were received and distributed at the general storeroom, *without a single accident.*

Safety inspections of all yards under the care of the purchasing agent are made daily at 7 a. m. and 1 p. m., insuring the constant safety of those employed on the various kinds of work.

All bureaus of the purchasing department have "Safety First" suggestion boxes for the use of employes having recommendations to make, whether for the safety of their own department (these suggestions are passed upon by the purchasing department safety committee) or as a benefit to the company at large.

To prevent the repetition of accidents that have occurred, monthly bulletins are posted in all storeyards and storerooms, showing the accidents for the month and the manner of their happening. This teaches employes by practical demonstration *what not to do* on a certain class of work.

Goggles and gloves are supplied all men whose work requires their use and illustrated posters emphasizing the importance of protecting hands and eyes are conspicuously placed.

The safety movement begun by the purchasing department, has since spread throughout the company and now each department has its safety force to reduce accidents to a minimum. In addition, the company, every April and May, secures the services of an American Red Cross Society doctor, who gives pertinent lectures on accident prevention, first aid principles and the application thereof, resulting in a practical knowledge of what to do in emergencies. These lectures in the past have proven extremely beneficial as the first aid treatments outlined have been called into play in a number of instances.

Expensive machinery is protected from damage in various ways which means further safety for those employed about

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them. It is well known that if the field switch for substation apparatus (rotaries, boosters, balancers, etc.) is opened while the machine is operating, it will cause the machine to speed up and tear itself to pieces. All field switches, therefore, are constructed so that it is impossible to entirely open them without removing a bolt running through the outer end of the clips. The danger of a switch used in starting machines being left closed after the machine is running and an attempt being made to start another by closing a corresponding switch, resulting in a dead short circuit through the second machine, is entirely eliminated by the use of a single removable blade for all starting switches.

On those parts of our system where it would be disastrous to close two adjacent high tension switches at the same time, an interlocking device is installed, preventing the closing of either unless the other is in an open position.

The foregoing is necessarily a brief resume of some of the methods taken to safeguard life and property and make working conditions safer. But, after all, safety rests largely upon the shoulders of the men themselves and the men are rapidly being educated through lectures, periodicals, departmental committees and other methods to appreciate and live up to that universal big-business slogan, "SAFETY ALWAYS."

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178 SAFETY AT THE GAS WORKS.—In general it can be shown that 90 per cent. of the personal injury accidents are due to the carelessness of the men themselves rather than to the conditions under which they are operating. It follows, therefore, that the education of employes along the lines of personal and mutual safety is of prime importance. In order that this education may be accomplished there should be a general safety committee made up of unprejudiced men. In Schenectady, where we have a combined gas and electric company, our general safety committee is composed of the superintendent of the electric department, the superintendent of the gas department, and the head of the claim department. This committee makes periodical inspections and its report is always read and discussed at the weekly meetings of all the heads of departments and foremen. Each department head should then discuss the conditions in his particular department with the men in order to point out dangerous practices. The following are some of the elementary practices that are drilled into our men:

Gas Holders.—Whenever a new gas holder is being constructed and piping connections are made to the gas mains there should be at least two valves between the gas supply and the holder under construction, the pipe between the valves being either filled with water or thoroughly vented.

Outlet valves of holders in operation should be locked.

Outlet drips should be pumped six times a day whether they need it or not. Any unusual amount of drip water should at once be reported to the foreman. All other drips should be on a periodic schedule, arranged according to the amount of condensation collected.

Station governors should be inspected daily. A recording pressure chart should be installed at the outlet and be placed in the office so that irregularities in pressure will be promptly noted.

Six inches or more of snow should be promptly removed from the holder crown. The object of this is to prevent excessive pressure which might blow the holder seals, or to prevent listing due to an uneven load on the crown.

Steam siphons in the cups should be so designed that the discharge is above the water level. This will prevent the cup water from siphoning back in case the steam goes off. The steam pipe should have drips at the landings so that the pipes and the hose can be drained. The steam to the cups should be controlled from a manifold which can be operated from the platform at the top of the water tank. In extremely cold weather at least four inspections per day should be made to guarantee against freezing of the water in the cups.

Relief Holder.—The water gas relief holder should preferably be equipped with an alarm to indicate when the holder is being lowered too far.

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Purifier House.—The purifier house should be capable of perfect ventilation. Roof ventilators should always be installed and be left open. Electric lighting in vapor proof protective globes is the only form of permanent lighting that should be installed. Small electric pocket lamps are convenient for general use.

The water to the seals should be controlled from the manifold installed at the entrance to the purifier house.

Boxes should be well steamed before men are allowed to enter them.

Differential gauges should be installed on each box and placed in the office so that excessive back pressure will be indicated and the caked box taken off to anticipate blowing of the seals.

Boilers.—Boilers should be insured in some standard company which sends out competent inspectors to make periodical inspections.

Blow off daily.

Test safety valves daily.

Well guarded walks or platforms should be provided for cleaning the upper part of the boiler.

Waste heat boilers, such as are used on water gas sets or in retort houses which have no continuous attendance, should be equipped with both a boiler feed water regulator and a high and low water alarm.

Water Gas Machines.—When starting up a machine after the generator is hot the carbureter should be lighted over by poking a redhot rod through the top sight cock and opening up the secondary air valve. When coaling generator the lid should be opened cautiously until the CO is ignited so as to avoid a flash in the operator's eyes.

The charge door should be cracked when the generator is being cleaned at the bottom, so as to avoid flaring back.

The blast pipe should have a vent between the generator blast gate and the carbureter blast gate in order to allow any accumulation of gas during the run to escape. This vent should be provided with a cap that automatically closes when the stack valve is opened.

When cleaning seal pot or wash boxes the gas valve to relief holder should be tested for leakage before work is started.

Scrubbers and Condensers.—Scrubbers and condensers should be well steamed before men are allowed to enter to clean same.

Oil Tanks.—Oil tanks should be provided with a vent covered with a brass gauze to avoid the possibility of a flashback into the tank causing an explosion.

All oil tanks should be surrounded by a concrete wall, filling the double function of fire protection and as an emergency container in case of steel tank leakage.

General Conditions.—All gears and chains should be installed according to standard practice. Goggles should be provided and worn on all chipping work, in coke handling house and any other place where the eyes are in danger.

No smoking or use of intoxicants should be allowed on the premises.

By persistent and patient effort men may gradually be impressed with the value of suggestions in line with those given above, and with the growing appreciation of these and of personal responsibility we may confidently expect greater safety.

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179 GROUNDED SECONDARIES, AND GROUNDED SHIELDS. — Some fifteen years ago a boy was sent into the basement of a store on an errand. Upon his failure to return promptly another employe was sent after him. He, too, failed to return. Thereupon the owner of the establishment made an investigation. He found the boy dead and the man unconscious.

Subsequently, when the electricians had been brought in because the lights would not burn, it became known that a primary bushing on the transformer had broken down and had in turn caused a breakdown of a secondary bushing, thus introducing high potential into the premises.

It matters not in what town this episode occurred; its counterpart was happening in many towns at about the same time.

Presently framers of the National Electrical Code began to be beset by those interested in life hazard, to the end that grounding of transformer cases might be required, and that the grounding of secondaries be made permissive, if not mandatory.

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The lighting companies objected, fearful of the result of this extra strain upon their transformers. The insurance interests objected, anticipating an increase in the fire hazard.

Year after year, in and out of conventions, Prof. William L. Puffer stood forth as the apostle of grounding secondaries. Progress was slight, however, and it was some years before the trend of electrical thought set at all strongly toward grounding as a mandatory feature of electrical construction.

Only two years ago, as a result of near eight years of effort, the Sub-Committee on Grounding Secondaries was able to submit a report which proved acceptable to the code authorities. Even this report was in fact a compromise, and, perhaps, very properly so, bearing in mind the universality of the scope of the code. It made grounding mandatory up to 150 volts and permissive above this figure.

Perhaps, this is as far as the National Electrical Code could be expected to go. It is, primarily, a fire protection code rather than a safety to life code. The great majority of those in whose hands its enforcement lies are fire underwriters' men, who could hardly enforce with authority any safety to life requirements. Someone else must take up the work where the underwriters are obliged to drop it; and for this reason the Bureau of Standards has stepped into the breach.

From the very beginning, the neutral of Edison 3-wire systems has been intentionally grounded. This grounding is now demanded by the code, as is also the grounding of all low potential circuits "when such circuits are so arranged that under normal condtions of service there will be no appreciable passage of current over the ground wire," and when "the maximum difference of potential between the grounded point and any other point in the circuit does not exceed 150 volts."

The limit of 150 volts was selected because this is the maximum potential which everybody agreed might be experienced by any healthy person without fatal or even severe results. As to the effects upon the human system of voltages above this figure authorities disagree. It is a matter the determination of which must depend upon the attitude of the local police and health authorities.

Here in New York we have felt that it was better to provide absolute assurance against accidents due to transformer breakdowns than to safeguard everybody against moderate shocks. Consequently, we have made grounding mandatory in all cases where the maximum difference of potential between the grounded point and any other point on the circuit does not exceed 320 volts—that being the maximum difference of potential which can exist between line and ground on any low potential system with neutral grounded which would be permitted within a building.

In this grounding of secondaries is found an important contribution to the safety to life idea. We may go much further, however, without great effort, or without unduly disturbing the industry.

If we are now protecting the public against *severe* shocks, why not furnish protection against *all* shocks? Why not so construct or guard our appliances that live parts cannot be touched?

The general adoption of this thought will mark another advance, but one in which haste must be made slowly. We can begin by polarizing our sockets so that the screw shell will be of the same polarity as the outer shell. This will prevent shocks when screwing lamps in or out, and will lead to a simplification of the socket itself because the screw shell will eventually become identical with the outer shell.

We can abandon the use of exposed terminal rosettes or receptacles.

We can require the placing of grounded metal shields (cutout and switch boxes) about fuse blocks and knife switches and, by gradual and steady pressure extending perhaps over several years, we may be able to secure the redesign of these cutout and switch boxes so that the operation of the knife switch will be effected from a point outside the box, and the act of opening a cutout box for the replacement of a fuse will remove potential from the terminals.

And, looking down through the years (since the safety requirements of today become the gross negligence of to-morrow) we may see dead front switch-

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boards everywhere, bus bars covered with insulation or encased in grounded shields; all live parts covered up.

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180 FACTORY WORK.—So much has been written by various experts for SAFETY ENGINEERING, that it is somewhat difficult to add anything that will be of interest to its readers in general.

The opportunities for accomplishing a great deal in this line are more pronounced in some factories than in others. The great steel and railroad companies which have a regular corps of safety experts at work all the time, do more that can be talked about and written up for the benefit of the public generally than we who have but a limited opportunity for exercising our ability and ingenuity in this direction.

In our particular case, for example, there is little, if anything, to be said which will be novel or particularly interesting. We have guarded our punch presses, or at least such presses as permit guarding. We guard our belting where it comes down to the floor or where it passes over the heads of workmen, in special cases. (I refer particularly to driving belts from motor to line shafts.) We protect our geared machines and punch press flywheels. We have placed toe guards on our passenger elevators and screens above the freight elevators. The various machines in the wood working department, shapers, saws, joiners, etc., have been provided with proper guards. We have fire drills and suitable fire fighting apparatus. We are doing everything we can in reason to decrease possible accidents. We operate a suggestion scheme, we ask the employes for suggestions on "Safety First" problems and other problems as well. We credit employes with all suggestions approved and reward them in accordance with their value at

Guarded Blue Print Drying Machine.

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the end of each year, the company giving an annual banquet and every man or woman who has had a suggestion approved during the year receives a ticket to the banquet, at least. Those who have made many valuable suggestions are rewarded accordingly.

A copy of our February issue is enclosed and you will note that various articles of value were presented at our latest annual banquet. As we add to our equipment we go over the possibility of injury to the employe during the operation of the machine in question and endeavor to anticipate possible accidents. We provide and insist upon the use of goggles in our iron working, grinding, oxwelding and spot welding departments. The most recent machine which we have found it necessary to guard is our blue print drying machine installed but a short time ago. Before the guard was placed on the machine, we had a rather serious accident, the operator having been admittedly careless with the result that his fingers were badly crushed and burnt and the loss of the use of two is still a possibility. This shows the need of guarding a new machine before placing it in commission, if possible, and the absolute necessity of guarding a blue print drying machine is beyond question. The photograph enclosed shows the machine as now guarded.

Fig. 1 is the large steam heated drum which dries the blue prints. The canvas belt carrying the wet print, passes between roll, Fig. 1, and roll, Fig. 2. The operator's fingers were caught between the canvas on roll, Fig. 2, and the steam heated drum, Fig. 1, and badly burned. Guard, Fig. 3, prevents any possible recurrence of such an accident.

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181 PREVENTION OF ACCIDENTS AND WELFARE WORK.—While many persons have not followed this subject, those who have read the articles that are continually being written will realize the difficulty of giving any original ideas; nevertheless, there are points, which, though touched upon, great stress has not been laid upon. But before dwelling on them, I will refer to two points frequently written about, Devices and Education.

Statistics have been given, showing that by the use of devices, accidents have been decreased 33 per cent, and that by education, and co-operation, they have been reduced 66 per cent.

While speaking of statistics, I would like to call attention to a report from the government records, where the statement is made that, in 1913, the deaths from accidents were 75,000; also, that in the last ten years, 624,360 men, women and children have met accidental death and 2,000,000 persons have been injured. Various companies, one of which employs 10,000 persons, report large decreases in accidents.

These statements show the great need of continued, earnest work, as well as the value of the work which has already been done. Continued study of conditions in connection with accidents as they occur will suggest devices for protection.

The decrease of 66 per cent in accidents is due largely to the co-operation of the men. There are doubtless many places in the United States, where this work has not been done and, as its introduction is always met with opposition, I will narrate, for the encouragement of others, one of my earliest experiences. At the close of our meetings, an actual demonstration is given of the method of detaching a victim, with safety, from a live wire; after that, the men are taught how to open a locked jaw, bringing forward the swallowed tongue (which occurs in electric shock), and then proceeding with the prone method of resuscitation—calling for one man to telephone for a doctor and pulmotor, and another to bring the medicine kit. The demonstration is given by asking one of the men to take a position on his back, holding a string, which represents a wire, so that the safe way to detach him can be shown. At first, this method called forth laughter and criticism, but it was persisted in. After this, a foreman is called upon to describe what to do in case the accident happened on a pole. Then, one of the linemen is requested to do that which had just been demonstrated. At each station

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I went, they seemed to make light of the instruction until, after a heavy storm (which they all had reason to remember, for wires were down in the street) one of the superintendents saved a boy's life, and acknowledged that it was because of the instruction he had received.

Afterwards, when the string was brought out, and the laugh began, this incident afforded an opportunity to show the value of the instruction, and I have never since had any trouble. Now, it is only on rare occasions that I use the string, as an illustration—only when there are a number of new men that have not been trained.

The necessity for the co-operation of the men has been written about so frequently, that I will not dwell upon the subject, but will speak only of some of the means employed by which it may be obtained. Welfare work is accomplishing much. In some sections of the country, more is being done than in others, the amount being governed by the circumstances. Some have buildings for libraries, playgrounds are provided, entertainments are given. Education in chosen courses is offered, and many other benefits are planned for the men.

A large number of employers are not able to do as much as this, but all should hold meetings, and encourage their men to talk. That gives to the men the sense of manhood, to which they have an inalienable right, and brings about a co-operation which is real and true; not the sort that comes through fear, but that which comes from the heart.

They should be asked not only to be careful for their brother, but they should be asked also how it can be done. Through their suggestions many groups of accidents can be eliminated, as has been proven in my experience.

These meetings should be held subject to a general safety committee, to which the suggestions should be submitted and voted upon. Small prizes may be offered every quarter for the best suggestion for the prevention of accidents, and the improvement of the company's service.

At these meetings, serious accidents should always be discussed at length. Questions from the book of rules should be asked, as well as questions regarding new rules, that have arisen through accidents.

Instruction in the prone method should always be given, and talks on first aid to the injured should be given occasionally. One hour should be devoted to this work, at least once a month, at each station.

One of the important features in this work is to disabuse the mind of the workman of the idea of fatalism. That can be done by repeatedly referring to statistics, showing the decrease of accidents; also by referring to a bulletin board, upon which should be posted each month a table showing the percentage of decrease (or if increase, giving the cause).

The law that there is a cause for everything must be thoroughly taught and, if presented rightly, the way will be cleared for a right habit of thinking, and no carelessness or ridicule will accompany the thought each day, on beginning work. "I will be careful, I will obey the company's rules, I will not drink, I will think of those dependent upon me."

It will be found that all these subjects cannot be gone into in one hour, and, as the work is constantly growing, there will be a great variety of things to talk about. Sometimes the men get talking, and extend the time beyond the hour. Allow them to interrupt you at any part of your talk. Treat them with the same respect that they extend to you. And you will find that they will give you that intelligent attention and kindness, which is necessary to successful co-operation.

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182 SAFETY IN CENTRAL STATIONS.—One of the distinctive features of accident statistics in central stations is the relatively low rank that electricity itself holds among the causes of accidents. The returns from the companies generating electricity for commercial purposes, and which have taken an interest in accident prevention work, show that approximately 15 per cent of the accidents to their employes are due purely to electricity. The remaining 85 per cent are due to causes common to all classes of industries, such as falls, falling objects and other similar sources of injury.

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Of the 15 per cent of accidents due to electrical causes, the majority come under the classification of burns from short circuits. These may be caused by carelessness in the manipulation of knife or pole switches, or by tools coming in contact with live apparatus while workmen are using them. In every central station a rule should be made, and enforced, to the effect that every employe who must open or close switches in the course of his work on low-potential apparatus, should wear tested rubber gloves, and that on high potential work, in addition to the gloves, he should use a wooden pole eight or ten feet long. If the employe takes these precautions, and is also compelled to stand on a rubber mat or a dry wooden platform, he will be reasonably immune from burns or shocks.

Since, in the generating station or substations, the chief danger from electricity is due to the chance of employes coming in contact with generating apparatus or electrical conductors, it follows that every safety device and precaution of a mechanical nature should be provided. It is, therefore, essential that all high-potential conductors that are not fully protected by insulation be inclosed, either by screen guards or other suitable protection. These conductors, the controlling switches, and other apparatus should be designated on a diagram or chart, posted in a conspicuous place, and all employes in and about the station or substation should be required to become familiar with the layout. All moving and electrically-charged parts of the generating machines, as well as all stairways and elevated gangways about them, should have guardrail protection, and greater safety is obtained by having tested insulating material underfoot. All elevated gangways and switchboard galleries should be provided with toe boards to prevent material from falling to the floor below.

For work in the central station, only men properly trained and qualified to work on high-tension apparatus should be employed, and, whenever possible, the particular piece of apparatus undergoing repairs should be made dead. When it is not feasible to deaden apparatus or circuits carrying less than 500 volts, the workmen should take every possible precaution, by using insulating material and insulated tools, and follow safety instructions in other ways. When work is to be done on apparatus carrying potentials of 500 volts or more, there should be a hard-and-fast rule that such apparatus must first be disconnected and grounded. The man who is going to do the work, or the foreman of the gang, should personally see that this precaution is properly taken. Proper locking devices for keeping the switches in open positions, and warning tags, should be provided, and these should remain in place until the same man returns, and signifies that the work has been completed, and that the apparatus may be safely charged again. The telephone should not be used for this purpose, as it is very easy for misunderstandings to arise. For example, five and nine sound very much alike over the telephone. A workman using the telephone may order a circuit, numbered five (or designated by a number having five as one of its digits), deadened, and may receive assurance that this has been done; but the switchboard operator may have understood the word to be nine instead of five. The assurance of safety, given by the operator to the workman, may then be the latter's death warrant.

It is, unfortunately, true that, notwithstanding safeguards, supervision and inspection, no piece of work is immune from accidents so long as a careless or unsafe man is engaged to do the work. There is no place for such a man in our industrial plants, and certainly not in a central station. A set of regulations should be drafted and rigidly enforced, to suit the conditions that obtain in each central station. If each and every employe is made to understand that the slightest infraction of the regulations means not merely instant dismissal, but may mean the death or permanent disability of some of his fellow workers, the accident rate from purely electrical causes in central stations will be materially decreased.

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PRIZES FOR JUNE ARTICLES.

First Prize. No. 175. O. H. Judd, Safety Inspector, American Steel Foundries, East St. Louis, Ill.

Second Prize. No. 171. Walter I. Sweet, Mechanical Expert on Accident Prevention, General Accident, Fire & Life Assurance Corporation, Ltd., New York City.

Honorable Mention. No. 172. Robert C. Salisbury, Safety Inspector, Illinois Steel Company, Joliet, Ill.

Other meritorious articles were contributed by John B. Bird, Chief Engineer, Joseph Bancroft & Sons Company, Wilmington, Del.; Robert H. Fulton, Jr., Night Superintendent, Kensington Works, The United States Aluminum Company, New Kensington, Pa.; R. E. Smith, Employment & Safety Inspector, Universal Portland Cement Company, Buffington, Ind.

COMMENTS BY MEMBERS OF THE COMMITTEE.

I consider article No. 171 the best, and my reason is that in our plants we are putting on our bulletin boards a great many pictures that are sent out by the National Safety Council, of which we are members. These pictures show the result of doing things the wrong way and usually carry an explanation with them which, we believe, sinks into the memories of those who look at them. Our bulletin boards are at the main entrance of the plant where everybody comes in and goes out, and are also put up in various parts of the plants.

No. 175 gets my vote for first prize because of the last paragraph of his article which is so good that I will repeat it: "Stay among the men, work with them for safety pointers, receive their suggestions, get their co-operation, and safety education will gradually 'kill' carelessness, and the greatest safety slogan printed—'A careful man is the best safety device known'—will prove an earnest endeavor with success."

I prefer 172, as it gives a plan for good, practical work in the lessening of accidents. So do the others. It is hard to choose from among them.

The writer of 173 touches on one of the most senseless causes of factory accidents. It is difficult to persuade the skilled workman that he is acting in a careless manner, for he is so confident of his own ability to escape injury that he resents advice on the subject. However, "horse play" is a thing which interferes with the proper working of any industrial plant, and it is the foreman's duty to see that no "horse play" is carried on by men while on the company's premises.

I cast my vote for No. 174. Infection from small wounds is a prolific source of much lost time. Although I can hardly agree with the writer on his method of posting same on bulletin boards by means of horrible examples, nevertheless I believe that he has the right idea on this point.

It sometimes happens that it is hard to tell which one of these articles is the best. Each of them always seems to contain some one thing that makes it stand out for the time being but when you size up the others, they, too, come forward. This seems to me to be very much the case this month, but, when I find this condition to prevail, I usually size up the entire situation and see which article has the greatest range of good. Upon this basis, my vote goes to No. 171 for the reason that I think there is no one thing that has the virtue of quick education that the picture has and safety is simply applied education.

No. 171, "The Use of Photography in

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Safety Work," is by far the most interesting article in the June issue. I like the idea of using pictures showing the causes of accidents, the remedy and the suffering caused. One of the most difficult points to gain is to secure the consent of the small mill-owners to use guards. The use of pictures as the writer suggests, often overcomes this difficulty. Another point to be appreciated in the article is the use of the weekly pay envelopes to show the cause of accidents and the effects.

No. 175 receives my vote for first prize. The lines suggested by the writer, for the education of workmen in safe practices, will largely determine the success of the safety problem. Give them the right kind of encouragement and the results will be surprising, as has been demonstrated in plants where systematic safety work has been carried on.

The use of photos is so important in safety education that 171 should be commended.

After carefully reading the articles in "The Man on the Job" I have selected 175 for the first prize. The writer has brought out some very important points on the following topics: Carlessness and ignorance the cause of accidents; unconscious education of employes through their environment; hints to safety inspectors, one of which is not to keep aloof from workmen, but to mingle with them and receive their suggestions; daily study of habits and occupation of workmen, and publication of dangerous practices, with illustrations. The writer has used a sentence which I think would be well for every one interested in safety to bear in mind. It is this: "A careful man is the best safety device known."

I vote for 172 as the writer of the best article submitted for consideration. The plan which the writer tells about appeals to me. It has evidently been put to the test and found practical.

In naming No. 175 as my choice for first place in the contest, I wish especially to strengthen the writer's remarks upon the sociable qualities necessary in the safety inspector. To my mind the success or failure of a safety campaign depends a great deal upon the inspector's attitude toward the men. He must never be too busy to explain; never too proud to mingle with the poorest of the workmen; never impatient at trivial suggestions, if he wants the interest kept up; never indifferent to an employe's appeal for advice, whether relating to safety or otherwise. The writer's pointers on safety education are good, and cover the general conditions to be met with in all plants where a safety campaign is being carried on.

Article No. 171, "The Use of Photography in Safety Work," is my choice for first prize. The use of photographs and illustrations in safety work is about the only way to interest the foreign work-

CONDITIONS OF COMPETITION

SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.

The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of any interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.

The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.

Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.

Contributors are requested to be as concise as possible. Articles should not exceed the limit of 800 words. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.

Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.

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man who cannot read English in the safety first movement. A bulletin board with photographs and illustrations of how accidents have occurred and how they could have been prevented, will always attract attention and leave a lasting impression on the minds of some of the men.

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No. 171 should get first prize. Very seldom does a workman recall instantly anything that he has read, or been coached on, when he gets into a dangerous place. But the recollection of a safety picture will cause him to "stop and think twice" before exposing himself to an unnecessary hazard. "Safety First" through safety pictures, sticks.

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No. 175 is my selection. It shows the only way to effectually carry out the "Safety First" method, which must be conducted by the "get together method" of education, and not the "sit in the front office and give orders" way.

HOME-MADE BAND SAW GUARD.

The accompanying illustration shows a completely guarded band saw, with the guards of a type which practically any workman could make. The driving belt as shown is protected by an angle iron frame filled in with screen, the screen being placed at a sufficient height from the floor to permit sweeping under it. The lower sheave is guarded by a solid box constructed of sheet iron, reinforced with angle irons. A door is hinged at the rear angles to facilitate the removal of the saw, and the tight and loose pulley belt shifting rod is extended through this door. The return side of the saw, a point often neglected, is guarded by a pair of hinged angles.

The upper sheave is guarded by a band retaining guard of two angles, upon which a piece of sheet iron is riveted. Side panels are rather extravagantly cut from solid sheet iron and filled with screen, the near panel being hinged. The sheet iron in the retaining guard is 14 gauge B. S. and it should be riveted to

the inner face of the angles with rivets not more than 4 inches apart. It is noted also that the cutting side of the saw is well protected between the saw guide and the retaining guard by an angle which slides inside the retaining hood.

A band saw guarded in this manner will live up to every requirement of the insurance companies and safety organizations.

UNLOADING CASES OF GLASS.

"We have cases of glass coming in, weighing as much as 1,900 pounds each," reported a workman of the Northern Furniture Company, Sheboygan, Wis. "There is no platform, the cases being moved by hand from the dray to the glass room floor. The top of the dray does not allow the gangway to rest square, and there is considerable risk when shifting these heavy cases into the glass room. I suggest that a light crane, or tackle, be rigged to assist in this work."

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"WHAT TO DO IN CASE OF ACCIDENT"

Resuscitation after Electric Shock

1. Break the circuit immediately with a single quick motion, using a dry non-conductor—a dry board, rubber gloves, macintosh or dry cloth. Don't use metal or moist material. The victim's loose clothing, if dry, may be used to pull him away, but do not touch his shoes as the nails are dangerous. Only use one hand.
2. Feel with finger in his throat for false teeth, tobacco, gum, etc.
3. Then commence artificial respiration thus—

A. Lay body flat on back. Draw tongue out of mouth, and have assistant hold. Seize both arms at the wrists.

(A)

B. Sweep the arms around horizontally away from the body and over the head, and exert a strong pull on them for a few seconds.

(B)

A foot may be placed on the shoulder of the patient being aided. This manœuvre fills the lungs with air.

C. The next manœuvre consists in rising and bringing the patient's arms down in front of the chest, making strong pressure with them against lower ribs, pressing on same with the weight of the body in order to drive the air out of the chest. Repeat this procedure regularly at the rate of about sixteen complete acts of respiration per minute.

Do not abandon this treatment under half an hour.

(C)

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"THE FIGHT AGAINST FIRE"

COMPETITIVE ARTICLES RELATING TO THE CONSERVATION OF LIFE AND PROPERTY BY FIRE PREVENTION AND DEFINING FAULTS OF CONSTRUCTION AND HAZARDS OF PROCESSES

No. 62 EFFICIENCY IN EDUCATING FOR FIRE PROTECTION.—All through the ages known to history fire has held an important place. From ancient times to modern we find fire as a force or a symbol in religion, in philosophy, in art and in science. Each race and nation has its traditions telling of the origin of fire. Legend has it that man was without fire until Prometheus stole some from the chariot of the Sun. Unfortunately the gods were jealous and objected to mortals using fire. Prometheus was punished, and the sons of men have never been able to completely subdue fire.

Fire is a good friend, but a strong enemy and, so far as is known, man is the only animal possessing the knowledge of procuring, sustaining and employing it. Perhaps it is because fire was stolen that it has such a mysterious fascination. You know yourself about the temptation of matches, bonfires, fireworks, campfires, torchlight processions, and even the thrill of a house a-fire. The normal, mature mind is able to control this "fire-feeling." Defectives and children are not.

It is a well-known fact that the feeble-minded and insane often have a mania for setting fire to buildings and property. It is, perhaps, not so well known that children have an almost uncontrollable desire to set fires. The "kid cops," or Junior Police, organized in New York City, among their rules, bind themselves not to set bonfires. All children are real fire-worshippers—loving fire for its own sake without reference to uses or consequences.

It is a law of brain action that education should follow the line of least resistance, and that we can be taught most easily along the lines of natural or inborn tendencies, or interests; also that new or acquired connections should be taught through the formation of habit. Education that co-operates with this great interest in fire will be easier and more effective than that which goes against natural tendency. Safety in regard to fire depends more on wise, safe habits than on quick, wise thought in case of danger when the mind is partly paralized through fear. In teaching the use of fire the natural inborn interest should be an aid, and it should be remembered that people learn by doing. Muscular memory which acts through habit must play an important part. It is frequently impossible to "think" what to do if we cannot "remember" what to do. I know a boy of eight years who lives in a house where heating and cooking are done with stoves. When at home this little fellow often takes entire charge of the fires. He gets up first and builds them, and when he comes in from school he sees at once what the fire needs, why it is too hot or too cold, etc.

Fire drills are a great aid to "Safety First," and the use of music—the sense of rhyme and rhythm—and the association of different senses aid in habit-forming, and are valuable for this reason, as well as for the practical one that they serve to empty a building quickly. "Presence of mind" is usually a condition of a trained mind, and the person who has not the habits that come from training or practice is too frightened to act wisely in danger, while the fireman, or the drilled youngster, will often play

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a hero's part. First aid principles should be taught. I knew of a woman who became so frightened when her dress caught fire that she ran to the neighbors. They shut the door in her face because they were afraid of catching fire. It should have been easy and natural to grab a rug, wrap the woman, and smother the fire, instead of actually losing the chance to save the life.

A child had its hand badly crippled by the wrong dressing of a bad burn. The fingers grew together from being bandaged tightly together. Small children should practice these first aid principles just as they practice rescuing from drowning, in certain schools. In case of accident they will remember what to do. This need of forethought has been pointed out in a new way recently. On the leading page of each New York theater programme there has lately been printed the following: "This theater, under normal conditions, with every seat occupied, can be emptied in less than three minutes. Look around now, choose the nearest exit, and, in case of disturbance of any kind, to avoid the dangers of panic, walk, do not run, to that exit."

Educate efficiently—

1. By making use of natural tendencies and interests to give positive instruction and training. "Don't touch the matches" and "Leave the fire alone" will not always safeguard and will never aid in development.

2. Make use of habit-forming methods and teach forethought.

3. Make use of first aid practice. Being prepared for accidents is one way to prevent accidents.

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No. 63 ADVANTAGE OF AUTOMATIC SPRINKLER PROTECTION.—Unforunately the idea has heretofore been all prominent that sprinkler systems are intended for use only in non-fire-resisting buildings, and, even so, principally to secure a reduction in the insurance premium. The thought of protection to the structural portions of the building or protection to contents has often been secondary to the thought of reduced insurance charges.

Among fire protectionists, however, and among broad-minded and far-seeing manufacturers, merchants and owners, sprinkler equipment is becoming more and more recognized as equally applicable and valuable in connection with fire-resisting construction, because of its automatic nature and the consequent protection afforded. Structures of steel frame, terra cotta and concrete construction are now being provided with this device of fire protection.

For warehouses, factories, wholesale and retail stores, also bonded warehouses, principally where the goods are of substances listed under the heading of "Spontaneous Combustion," automatic sprinklers should invariably be installed, even when these structures are of the most approved fire-resisting type. It would prevent many conflagrations. Furthermore, installing the automatic sprinkler in hotels of every description, covering places where fires may originate—blind attics, tops of towers, tops of elevator shafts, toilet rooms, porters' rooms, linen closets, help's kitchen, ballroom and laundry—would prevent the dragging of hose and the destruction of property unnecessarily. The fire could be extinguished with the aid of one or more sprinkler heads. Where fires smolder and burst out in flames, in close proximity to elevator or dumbwaiter, or freight elevator shafts, the timely action of the sprinkler would prevent many fires which result in the loss of life and property.

There are over 100,000 buildings in the United States which are protected by automatic sprinklers, aggregating a property value of thousands of millions of dollars.

The first sprinkler risk to be installed in New York City under the approval of the New York Board of Fire Underwriters was in 1884. Up to and including the year 1905, 605 approved sprinkler installations were made in Greater New York and its immediate vicinity. The maximum yearly number was 69 in 1892. The use of the sprinkler has, however, developed most remarkably in the mill or manufacturing centers, cotton and woolen mills, shoe factories and the like. Although principally used in storage or manufacturing buildings, it must not be

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supposed that sprinkler equipments are limited to these classes of structures. The requisites for efficient automatic sprinkler protection are:

1. The sprinklers must be located so that the distribution of water will cover all parts of the premises.

2. The sprinkler heads must be of approved make and a sensitiveness of automatic action suitable to the particular conditions of location and occupancy.

3. The sprinkler piping must be of sufficient capacity and under water pressure at all times, except where the dry pipe system is used.

4. The available water supply must at all times be of sufficient quantity and pressure.

5. The sprinkler system must be equipped with proper check and gate valves, in order to regulate the pressure from power supplies and in order to make possible shutting off water supplies for the purpose of repairs.

6. Some approved type of alarm valve must always be installed as part of the system.

All of these conditions are essential to obtain proper automatic sprinkler protection. Usual requirements call for sprinklers to be placed throughout premises, including basements, lofts under stairs, inside elevator shafts, in belt, cable, pipe and gear pulley boxes, inside of small enclosures, such as drying and heating boxes, tenter and dry rooms, chutes, conveyors, cupboards and closets, unless they have tops entirely open and are so located that sprinklers can properly spray therein. Sprinklers should not be omitted in any room because it is damp, wet or of fireproof construction. Experience teaches that the sprinklers are often necessary where seemingly least needed.

The fallacy of attempting to pick out the places where fire will or will not start has long been proven, therefore vacant basements, blind attics, concealed spaces, etc., all need sprinkler protection.

Two independent water supplies are absolutely essential for the best equipment, in order that one supply may always be available in case the other is temporarily out of service, and also that a primary supply of limited capacity or light pressure, may be reinforced by a secondary supply. At least one of the supplies should be capable of furnishing water under heavy pressure, in order that the opening of the first sprinklers may prove wholly efficient. This supply usually consists of either elevated gravity tank or an air pressure tank. The second supply must be automatic, and is usually provided by the city pressure, taken from the public water mains.

Gravity tanks should be placed at the bottom of the tank in each case, not less than 20 feet above the highest line of sprinklers supplied. This should be a minimum, and if an elevation of 30 feet or 35 feet can be obtained, so much the better, as the efficiency of the tank naturally increases with the elevation; otherwise commendable sprinkler equipments are rendered questionable as to ultimate efficiency because of light water pressure.

Ten thousand gallons is the desired minimum on all small risks. On the assumption of 20 gallons per minute per sprinkler, that would feed 25 sprinkler heads for 20 minutes.

Air pressure sprinkler tanks are preferable on roofs of buildings, and in case of failure of a pump to supply compressed air to the tank it can be converted into a gravity tank. These air pressure tanks are two-thirds full of water and one-third of compressed air. In the event of the pressure tanks becoming disabled the system can be as efficient as before.

In the old days it was hard to convince the proprietor of a hotel or any other building of the necessity of fire appliances—their presence was considered an eyesore. Now the public is more concerned with the fire hazard, especially in hotels, where such objections have largely disappeared. Plenty of hose and a good water supply, with fire extinguishers, are now an attractive advertisement. Automatic sprinklers are being introduced in the most hazardous parts of the risk, which is a desirable protection.

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No. 64 PUBLIC SCHOOLS AND FIRE PREVENTION.—Fire prevention is constantly receiving more earnest attention from thinking people, and the propagation of information along fire prevention lines is a mat-

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ter of considerable study. In a number of States courses on this important subject are a part of the curriculum of the public schools. The teaching of fire prevention in the grades, although slow, will undoubtedly bring the most fruitful results in the end; for a child, if properly impressed with the importance of fire prevention, will remember the teaching when it becomes mature and will pass on the ideas to the next generation.

In States which do not provide for the teaching of fire prevention in the schools, I doubt if the different State associations realize the importance of urging lectures in the schools of the towns and cities which they inspect. My experience has shown that superintendents are very willing to permit a competent person to address the pupils on fire prevention, and an opportunity to do this should not be overlooked. The address to be most effective should be along simple lines, and should include the common hazards of the home so as to be readily understood by the young minds. An outline of the topics to be discussed should include:

Matches: The damage from sparks and friction of parlor matches and the superiority of safety matches over the ordinary parlor variety. The necessity of keeping them in metal containers and out of reach of small children.

Gasoline: Its volatility; the danger from explosion; the awful result of attempting to start fires with it; the necessity of keeping it outside the home and in a tightly closed can away from open light and heat.

Kerosene: The necessity for careful handling and the danger from starting fires with it.

Gas Brackets: The danger from the swinging variety. The advantage of having them rigid and properly protected from flying curtains with sufficient clearance from combustible material overhead.

Stoves: Danger from flying coals and lack of air space underneath and behind when unprotected with zinc or tin.

Furnaces: Danger from improper protection from combustible material on top and sides and the lack of clearance. This also to apply to the smoke pipes.

Electric Wiring: The necessity of proper installation. Danger of short circuits from poor insulation. Defective switches. Hanging of drop cords over nails, etc.

Accumulation of Rubbish in Barns and Outhouses: Danger from spontaneous combustion. Carelessly thrown matches, cigar and cigarette stubs.

Burning of Rubbish: Danger of flying embers and the possibility of conflagrations in residence districts from this source.

Disposition of Ashes: These should not be placed in wooden vessels nor thrown against combustible materials. If in the furnace room, they should be disposed of daily.

CONDITIONS OF COMPETITION.

To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.

The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.

Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.

In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.

Articles will be received from any person competent to discuss the question of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. Articles should not exceed the limit of 800 words. No consideration of any kind is required for the privilege of competing.

Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.

Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.

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QUESTIONS AND ANSWERS

Subscribers to SAFETY ENGINEERING *are invited to ask questions on any phase or problem of fire prevention or fire protection. This includes construction and equipment of buildings, installation and use of apparatus, fire dangers peculiar to industries, etc. Questions received will be published each month, with request for replies by engineers, inspectors, officials and others interested in the subjects presented. If too long for publication, replies will be forwarded by mail direct to the inquirers. It is believed that, by this method, subjects on which there is a desire for special information will be developed. It will also put the authors of articles in touch with inquirers who wish further information on points merely touched upon or not made wholly clear in published articles.*

RUBBISH BURNER.—I. I. B., in SAFETY ENGINEERING for May, says: "We are seeking a burner that could be used, in the first place, for the collection of trash, and in the second, for burning it without hazard to surrounding buildings. If specifications for building such a burner can be had, we would be glad to know where we can obtain them."

If the rubbish to be disposed of is fairly combustible, such as loose paper, old boxes, and small chips and shavings, a good burner consists of a large riveted iron can, say 54 to 60 inches high, and three to four feet in diameter. If fire is started in bottom of this with a moderate amount of material, and not fed too rapidly, it will consume completely and throw no sparks. At least I have seen a number of these in use and no sparks issuing. Wind having a velocity of 20 miles or over might affect the action, however.

Such a burner will not consume solid rubbish like books, large bundles of flat paper and the like. The fire is a "slow" one, as all air reaching the base of the fire has to come in over the sides of the can, and the volume is limited.

No wire mesh burner on the market prevents the escape of sparks; in fact any pattern of burner which will permit direct draft to the base of the fire is bound to throw off sparks.

I understand the question to refer to *portable* burners for limited amounts of light refuse. It is quite easy to design a crematory for large amounts and heavy refuse, but such construction is costly. C. E. W.

APPARATUS NEEDED.—A playpipe of *steel,* not too heavy or clumsy, modeled on the lines of the Underwriter playpipe and finished against corrosion in kalamine or black oxide, preferably the latter. This should sell for something less than a brass or copper pipe. Also small nozzles and playpipes of steel.

If such a line could be placed upon the market it would meet with ready sale without doubt.

The reason for the demand is the facility with which a copper or brass pipe may be beaten out of shape or melted, and the high value of the metal apart from its form, which (because of theft) makes it very difficult and expensive to maintain equipments in exposed places and certain lines of business.

As it now stands, merely unscrewing the tips from a dozen playpipes will net the collector quite a tidy amount from the nearest junk dealer, whereas if these were of steel, their value as junk would hardly pay for the bag to carry them away in.

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Brick Flues: Explain defective construction and the disintegration of ordinary mortar by the elements. The necessity of annual fall inspections, repointing and recapping. Danger of fire from the accumulation of soot. Danger from open flue holes or papering over flue holes. The benefits of flue stops.

Metal Flues: The average life of the metal flue. Danger of corrosion of the metal by the elements and the consequent disintegration of the inside lining.

After the address an opportunity should be offered to the pupils to ask questions and for a short discussion. They should then be required to furnish an inspection of their own homes on blanks properly prepared, the inspections to be completed and returned the following day. To complete the work and to maintain the proper interest in the subject, a prize of from $5 to $25 should be offered for an essay of, say, 100 words on the subject of Fire Prevention, and only those pupils who have returned their inspection slips should be able to qualify for the competition.

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No. 65 CHILDREN AND FIRE PREVENTION METHODS.—The use of the fire prevention questionaire by school children is an excellent method of fire prevention education. The plan is to distribute a questionaire to the pupils and require them to answer the questions. The questions are such that a careful inspection of the home must be made before an answer can be given. Thus, one of the questions may be, "Are the chimneys and flues safe?" Then, directly following, "How did you determine this fact?" The questionaire has these advantages:

1. The child is given a definite task to perform which has to do with safety in his own home, thus the fire prevention problem takes on new and specific interest. The child will see the problem not as a far-away thing, only for discussion, but as something real existing about his own home.

2. The use of the questionaire by all the children at one time makes fire prevention a topic of discussion among them.

3. Not only is the child reached, but the parents also. In cities where tried, the parents have commented on the fact that the children wanted to answer the questions properly, and asked why this or that was dangerous.

4. It makes the child realize how real are the existing hazards, just how his own home is menaced, and what is most important, the child will then *seek* information about the methods of correcting the hazards found.

The making of an actual fire prevention inspection by the pupils will produce a more lasting impression on their minds than hearing about fire prevention. The questionaire is used successfully by several State fire marshal departments and by some city fire prevention bureaus. It will fit admirably into any other scheme of fire prevention education and can be repeated more than once each year with good results.

This questionaire method should be more generally adopted, especially by city fire chiefs. The school authorities will almost always co-operate. The blanks can be returned and often a little extra work by the chief will result in the correction of many hazards. At least, one fire chief has used the method with great success, obtaining safer conditions in his city immediately in addition to the sympatl etic co-operation of the school children in the work of fire prevention.

PRIZES FOR JUNE ARTICLES.

First Prize. No. 60. James A. Tierney, Inspector, Bureau of Fire Prevention, Division of Public Assembly, New York Fire Department, New York City.

Second Prize. No. 58. Howard Campbell, Insurance Engineer, R. B. Jones & Sons Insurance Agency, Kansas City, Mo.

Honorable Mention. No. 59. Harriet Henderson, Manton, Mich.

Another meritorious article was contributed by Henry J. Holzberger, Fireman, New York Fire Department, Hook & Ladder Company No. 124, Brooklyn, N. Y.

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COMMENTS BY MEMBERS OF THE COMMITTEE.

I vote for No. 58 as the winner. The writer gives clearly the hazards of fire in storage warehouses which could and should be eliminated to a large extent. It is a well-known fact that such fires are difficult to get at under the best of conditions, due to the large amount of combustible material stored and the small number of exterior openings which make ventilation of the premises difficult where same is heavily charged with smoke and gases. With strictly fireproof construction and other safeguards mentioned by the writer, the loss from fire would be reduced considerably.

I vote for No. 60, because I agree with his views that there should be some penalty for disregard of law and ordinary caution. That is a vital subject not half threshed out yet.

I vote for No. 61, because it places before the general public the danger that exists in department stores. This danger is further increased during the holiday season when the stores are in a crowded condition. A fire or panic occurring at such a time would result in a great loss of life. The suggestions offered by No. 61 are excellent and within reason. In fact, all in the June issue are worthy of consideration, but No. 61 dwells on a subject that enables us to conserve the lives of human beings in stores of this character.

Accept my vote for the author of No. 60, for the reason that he gives clear, concise instruction as to the preliminary steps of fire prevention, including principles and ideas, together with the laws to be enforced, and the educational campaign to be instituted for fire prevention.

No. 60 is good, because it covers The Fight Against Fire from the very start, first in insurance and then in a course of instruction to men, women and children and to owners of buildings, heads of schools and housewives.

I vote for No. 59 because the writer explains in an interesting and instructive manner the common hazards of kerosene, an article used by nearly everyone. Very few persons appreciate the danger of the vaporization of kerozene when subjected to only mild heat. This ignorance undoubtedly contributes materially to the setting of fires.

No. 60 should be awarded first prize, as the writer deals with cold facts, which every person who is interested in the matter of fire prevention must realize to be the sound basis for the extermination of preventable fires.

No. 60 contains the fundamental prinples of fire prevention. Get the laws, get them enforced, and you will have the people thinking.

No. 60 is entitled to first prize. His suggestions are excellent—first placing fire prevention laws on the statute books, enforcing them, having no divided responsibility, no conflict of authority, (which very often occurs) and giving the property-owner a square deal.

The writer of No. 58 in covering the dangers particular to storage warehouses points out the most dangerous custom, which, in my opinion, is the use of the stable for a lodging house.

I vote for No. 58. The writer discusses a very good subject. There is no doubt about the hazards that exist in transfer and household storage warehouses. The nature of the contents of such buildings and the manner in which they are stored, the large floor areas and large vertical openings that should be guarded and protected continuously, are often carelessly left to persons that are irresponsible. Dangerous conditions are often added to by careless handling of hay, straw, oils and grease, and the carrying of open

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lights, smoking, etc. Losses to buildings and contents of this character are generally large. Owing to the construction of stalls, the partitions of which are boards or pickets, for individual storage on the floors and deck floors of each story, the water damage is often large, even though the fire may be discovered and extinguished quickly.

No. 60 has the best article on fire prevention. He says "an ounce of prevention is worth a pound of cure," but some persons don't figure that way as long as they are insured, and can collect the insurance. But insurance will not pay for the loss of life that often occurs through carelessness or neglect, and if every person were held responsible and made to pay the penalty, it would change some person's way of thinking. He also suggests lectures in different places of business by a uniformed man, which is a good idea, as the man can take each industry and explain the different hazards attached to it. Employes get to be very careless and some don't even know about the dangers in the trade they are working at. It would also be a good idea to give out circulars printed in different languages after each lecture for the foreign employes to read.

My choice for the best article in the June number is No. 59. The writer explains in a brief way the test of kerosene and its dangers. If this article could be read in every household, I am of the opinion that the fire loss would be greatly reduced.

No. 60 is an able article, and the writer's suggestions should be practiced. The fifth paragraph contains everything in a nutshell. It strongly influenced my vote toward the writer of No. 60.

"SWEATING."

A fire in an ice-house at Lake Hopatcong, N. J., was caused by a chemical action called "sweating," which occurs in marsh grass or hay used in place of sawdust in the packing of ice.

PICTURE FILM BOXES.

The chemical laboratory of the Bureau of Explosives, New York City, continued in 1914 the study of materials that involve hazards in transportation, the methods of manufacture and shipment as the methods affect safety in transportation, and the examination of shipping containers for hazardous articles.

The chief inspector received sixteen motion picture film boxes for examination. The insulations of the boxes were tested by placing 10 grams of black powder in the middle of the top, bottom or side of each box and a bunsen burner underneath. A small roll of picture film—about 20 grams—was placed in an angle and the bunsen burner was applied to the outside edge underneath. Each box was dropped on an edge and on a corner and hit by a falling bar. Four of the containers were metal-covered cases.

The report on the test:

In considering the data it will be observed that all the hard fiber cases were punctured by a falling bar except in the two cases, in which the fiber was .125 inch thick; and another case made of 0.125 inch hard fiber, was punctured by this test. In no instance was a metal case broken or punctured by this test. It will also be observed that the metal cases lined with hard fiber or asbestos were much more resistant to heat and to the transmission of heat than are boxes made of the same thickness of hard fiber alone.

Another disadvantage of the fiber box, from the standpoint of safety, is the inevitable gap between top and bottom in the telescopic form in which it is always made. This telescopic form is also more flexible, and its capacity can be increased by drawing up the lid. At the same time the opportunity for entrance of sparks is also increased. The hard fiber forms a good lining for a metal box, but it is evident that a strong metal box lined with fiber of ⅛ inch thickness is stronger than the fiber box alone, and also much more resistant to heat and fire. This latter principle is observed by engineers in making firedoors of wood and covering them completely with tin. Such doors give greater protection than a wooden door or an iron door.

If hard fiber board boxes are permitted, the question as to difference of quality of hard fiber will probably arise. It is thought that, if hard fiber boxes are used, the telescopic form should be abandoned, as this form is obviously not tight nor sparkproof, and under a strict interpretation of the rules is prohibited, even with metal boxes. If this material is to be used for picture film, it should be made up in the form of small trunks properly reinforced, with a tightly fitting lid.

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HERBERT M. WILSON.

Herbert M. Wilson, engineer in charge of the Pittsburgh Experiment Station of the United States Bureau of Mines, has resigned from the government service to become the director of a newly-formed organization to be known as the Coal Mine Insurance Association.

Early in 1907, when Secretary James R. Garfield added a Technologic Branch

HERBERT M. WILSON,
Director of Safety, Coal Mine Insurance Association.

to the United States Geological Survey, Joseph A. Holmes was appointed chief of the new division and Mr. Wilson was appointed as his principal assistant. With the creation of the Bureau of Mines, Mr. Wilson became engineer in charge of the Pittsburgh station, a position which he has held ever since.

Mr. Wilson was graduated from the School of Mines, Columbia University, New York. He has spent the last eight years in developing mining experiments, including the use of explosives, experimental investigations in electricity and lighting, and especially in the mine-safety, mine-rescue and first-aid operations of the Federal Bureau of Mines. He is on the Advisory Council of the Underwriters' Laboratory, Chicago; is on the Executive Committee of the National Safety Council, and was the first president and is now the secretary-treasurer of the American Mine Safety Association.

The Coal Mine Insurance Association, of which Mr. Wilson is to be the director, is a combination of ten American and British insurance companies that have associated themselves for the joint underwriting of coal-mine accident insurance.

"SAFETY FIRST" ON THE CHICAGO & ALTON.

While maintaining no safety department, the Chicago & Alton Railroad looks after "Safety First." A letter from President Bierd, given in full below, explains a letter from his office, dated April 14, 1915, published in the May number of SAFETY ENGINEERING:

THE CHICAGO & ALTON RAILROAD COMPANY
Executive Department
OFFICE OF THE PRESIDENT

Chicago, June 19, 1915.

Editor SAFETY ENGINEERING, New York City.

Dear Sir:—My attention has been called to the May, 1915, issue of SAFETY ENGINEERING, or to an article appearing on page 388 of the May issue. In this issue of your paper you give a verbatim copy of my letter of April 14, 1915, which acknowledges receipt of your letter of April 10, and advising you that the Chicago & Alton Railroad maintains no safety department.

In your paper and next below the photographed letter you state to the public that this interesting letter is a reply to a general inquiry sent out by the editor of SAFETY ENGINEERING to a number of railroad companies and industrial corporations, asking for particulars of their organization for safety.

I cannot find in your letter of April 10, to which my letter of April 14 is in answer, that you asked the Alton Railroad for any particulars of their organization for safety. Your letter states that if we have photographs showing accidents and short descriptive comments, you would appreciate our courtesy if we would send them to you for publication in SAFETY ENGINEERING. You further state that you desire to get for publication, interesting short articles with pictures that teach the lesson of safety. You further state you will appreciate also re-

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ceiving literature on any phase of safety work issued by our department.

If I can understand your letter at all, you are only asking that the Alton Company furnish you information or data upon which to write articles; in other words, something to supply matter for your monthly issue. My opinion of your letter is that you want the railroads to furnish you something in the way of information as outlined in your letter that will cost you but little money, time or effort to build up your paper, but there is absolutely nothing in your request upon us that in any particular or in any manner asks for particulars of the organization of this company for or in behalf of the safety movement. Therefore your statement appearing on page 388 of your May issue is not correct and is not a correct statement to the public, but to the contrary, publishing my letter as you have and the reference made thereto, "this interesting letter," is a direct slur upon the Alton Company and in my judgment was given out to the public as a slap against this company, and I so consider it.

I did not personally see your letter of April 10, and the same was answered by a clerk in this office, and I believe he answered the only direct question you asked, which is in the second paragraph of your letter when you refer to any issues made by our department, and he properly advised you that this company did not maintain a safety department.

However, all affairs, conditions and details of what is so popularly designated "Safety First" is looked after on this railroad and supervised just as carefully and just as efficiently as upon other railroads which have such safety organizations or bureaus, but because of the size of this road and the territory it covers, a so-called safety organization is not necessary under and by such a head, but all of the elements looking to safety are cared for and dealt with in the interest of the public, the employees and the property as effectually with us as any other road that I know of, yet no organization as you have been told under that name and head is maintained by this company.

I am writing to ask that you correct as you should correct, the misleading information you have published in your May number, placing this subject properly before the people or the public who may read your paper. If you do not, I shall be compelled to do so through other journals that will correct it.

I beg to subscribe myself,

Yours very truly,

W. G. BIERD.

New York, June 23, 1915.

W. G. Bierd, Pres. Chicago & Alton Railroad, Chicago, Ill.

Dear Sir:—This is in reply to your letter of June 19. On April 10, a letter was sent from this office to the Chicago & Alton Railroad, and to other industrial and transportation corporations, saying that we would appreciate the courtesy of receiving photographs, short articles with pictures teaching lessons of safety and other literature on any phase of safety work issued by the safety departments of the corporations. In reply we received a letter from your office saying: "The Chicago & Alton Railroad maintains no safety department." This letter, of course, was a complete answer to our letter of April 10, for if you had no safety department you could have no safety department literature to send us.

Your letter indicated to us that the Chicago & Alton maintains no safety department and your statement was made so positively that we regarded the fact as interesting. We had no purpose to slur or slap the Alton company, as you consider, and we published your letter merely as interesting news.

Of course, we shall make a record in our pages of the attention you are giving to "Safety First" conditions and details, as set forth in your letter of June 19. This we shall do as a courtesy to the Chicago & Alton, in order that the misleading information conveyed in your letter of April 10 may be corrected, before the readers of SAFETY ENGINEERING in accordance with the information conveyed in your letter of June 19.

Yours truly,

FRANKLIN WEBSTER, Editor.

SAFETY ENGINEERING avails itself of this opportunity to make further acknowledgement of the receipt, from many persons and corporations, of instructive pictures, bulletins, etc., on the subject of accident prevention, and to invite its readers anew to continue to send to the editors matter of this description, as they may find it convenient to do so.

"SAFETY FIRST" IN SCHOOLS.

S. G. Watkins, general secretary of the "Safety First" organization of the Boston & Maine Railroad has addressed 40,000 school children during the past year on the subject of safety. SAFETY ENGINEERING is pleased to publish this letter from Mr. Watkins, received a few days ago:

"On the editorial page of SAFETY ENGINEERING for June under the title 'We Must Reach the Youth,' I find these words: 'SAFETY ENGINEERING would like to see the time hasten for the subject of safety to be taught in our public schools, etc.'

"You may be glad to know that the 'Safety First' organization of the Boston & Maine railroad began work along these lines about one year ago. As an experiment I visited the schools in my home town. The teacher in one of these schools asked the children of each class to write me a letter on the lecture they had heard, with the understanding that I should receive two letters from each class. When I received the letters every one, in some form or other, contained these words, 'I did not know of the danger.' If this is true

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and the child is running into danger because of lack of knowledge, we certainly owe the child something more than he is getting. Acting on this suggestion during the past year, I have visited a great many schools, aggregating 40,000 children. The plan adopted was to assemble the children in each school building in their school hall. In many instances we had more than 1,000 children assembled at one time. In two instances, where the school had no hall, the children were assembled in the school yard, and in a lecture of 20 to 30 minutes the children were told of accidents which had happened and how they could have been avoided.

"When this work was started I had serious doubts of its success, but when I found how attentively the children listened and how enthusiastic the teachers became, I was soon convinced that the public schools contained a great field for 'Safety First' work.

"We closed the school year with a 'Safety First' campaign in the public schools of Holyoke, Mass., reaching something over 7,000 children between the ages of 6 and 18 years. I enclose a clipping from the Holyoke *Transcript* relative to this subject."

The Holyoke *Transcript*, in a report of Mr. Wilkin's lecture, said: "Mr. Watkins devoted a great deal of his time to explaining the numerous ways in which boys and girls are killed or seriously injured through thoughtlessness or carelessness. He recited statistics of the number of children who were killed or injured while trespassing on railroad property, and gave many touching stories of accidents, which he had investigated personally. In the past 24 years, there had been 31,049 children under 18 years of age killed or injured, in the United States while trespassing on railroad property. To bring home to the children more forcibly just what this number represented, he pictured a city street, one mile long, with children lined up the full length of it, in twelve rows; this would represent about the number mentioned.

"By relating several stories on each subject, he drew forth the lesson against walking on railroad tracks, playing about stations or railroad yards, running across tracks without looking well in each direction, walking on flange-rails where small shoes can be caught and imprisoned with the danger of a train approaching, running carelessly across streets in front of automobiles and street cars, and throwing stones at anything. The stories were not cheerful but forceful and necessary. The speaker balanced the gloomy side of the lecture with a pleasant humor that appealed strongly to the children, and he held their undivided interest throughout."

"GOOSING."

Viewing with alarm the steady increase in its shops and on the street of the practice popularly known as "goosing" and believing that, unchecked, these acts would soon become a cause of an increased number of injuries, especially in the factory, the Avery Company, Peoria, Ill., decided to make a determined stand against goosing practices. To that end it issued to all departments of the Avery factory the letter below:

AVERY COMPANY'S BULLETIN ON "GOOSING."

No. 950.
JUNE 1, 1915.

TO ALL DEPARTMENTS: Of all fool acts, about the most foolish, senseless, asinine act is that commonly known as "goosing."

The unfortunate victim is never safe from attacks, without the least regard for time or place, by those who call themselves his friends. It is a pity that the victim doesn't smash his enemy upon the nose, but more the pity, the victim is usually a good sport who takes the joke (?) as he thinks a good sport should.

The condition of being "goosey" is easily acquired by anyone who is subjected to these attacks by his companions. It grows gradually, and insidiously, the victim dreading to have his companions approach him from the rear until finally he loses absolutely all control of himself when "goosed." This act is senseless enough when in a perfectly safe place, but it certainly has no place in a factory where the victim is in danger of becoming injured, perhaps killed.

One jump into a moving machine, a live switch, a pile of stock, or off a platform, or into a hole, may cripple the victim for life, if not kill him. Should such an accident occur in the Avery factory, the Avery Company would probably be called upon to pay the cost. Certainly the Avery Company is called upon to afford its employes all the protection possible. We feel it our duty to do so, and have decided to take a determined stand against "goosing."

EFFECTIVE AT ONCE.

The Penalty of Goosing Another Workman Is Immediate Discharge.

We believe that you will all agree with us that the penalty is a just one and that "fore-

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warned is forearmed." Please post this letter where all can read.

AVERY COMPANY.

The Avery Company expected that this letter would be taken in a spirit of levity by the workmen, but much to its gratification the bulletin was well received. Practically all of the foremen and many of the workmen stated in unmistakable terms their approval of the letter and concurred in the sentiment expressed. Several foremen remarked that it was the most effective bulletin that the safety department had posted.

The practice had grown to such an extent that workmen who operated dangerous machines never felt secure from the attacks of the would be practical joker who took delight in taking advantage of their weakness. Many workmen who were susceptible would throw whatever they had in their hands in an entirely irresponsible manner when attacked. In fact, the majority of those who are susceptible become irresponsible for the moment.

The workman who is rolling sheet iron with his fingers close to the rolls or a man operating square shears, in fact any man who is doing any one of a great number of operations in a factory, is a poor subject for a joke of any kind.

The moral effect of the Avery letter has extended beyond the shop, even to the extent that where, as before, the practice was carried into the street cars among the men returning from their work, the men now act in a much more gentlemanly manner than they did prior to the posting of the letter.

Believing that its success in stopping "goosing" may prove of value to other employers and persons interested in the safety movement, the Avery Company gives to SAFETY ENGINEERING the benefit of its experience. Elimination of unsafe practices is as essential as proper safeguarding of unsafe machines.

ENORMOUS MANUFACTURES.

Dr. Albert A. Snowden, a member of the foreign trade commission of the National Association of Manufacturers, was one of the speakers at the annual convention of the association in New York on May 26. He gave particulars of the manufacturing industries of the United States, the plants of which have a normal yearly output to the value of $28,000,000,000. More than 22,000,000 persons, or nearly one-quarter of the entire population, depend directly for their livelihood on the manufacturing industries. The number includes 9,000,000 employes and the members of their families.

He said that the largest and strongest organization of manufacturers in the world was the National Association of Manufacturers of the United States, consisting of about 4,000 members, with more than $12,000,000,000 invested in their businesses, and employing nearly 6,000,000 workers.

The members' plants, he said, produce more than one-half of the output of manufactures in the United States and more than 90 per cent of the manufactured goods exported from America, the exports being only one-fifteenth, in value, of the amount produced for home use. The members of the association produce each year more goods than are manufactured by the entire population of any other nation.

The plants of the members of the association furnish about one-half of the world's railroad trackage, rolling stock and general equipment, three-fourths of the world's telephonic installation and equipment, most of the mechanical equipment and supplies of one-third of the newspapers and magazines of the world. They do 80 per cent of the world's automobile manufacturing, and provide machines and implements for one-half the world's harvesting and general farm labor.

Concerns in the association manufacture the bulk of the world's lumber and dressed timber, and their machines do the main part of the world's woodworking.

Dr. Snowden said that the association had led a number of public educational movements, among them those for workmen's compensation, accident prevention, fire prevention, industrial education and foreign trade promotion.

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"SAFETY FIRST" FEDERATION.

The Transportation Committee of the "Safety First" Federation of America held its initial meeting on Tuesday, July 13, at the Craftsman Building, New York City. The meeting was for the purpose of defining the future policies and activities of the Federation and to consider the field work which has been assigned to this committee. The session was presided over by C. Loomis Allen, president of the American Electric Railway Association, and chairman of the Transportation Committee of the "Safety First" Federation.

The session was taken up by a discussion of "Safety First" methods in operation in their respective localities. Owing to the large number of subjects to be considered by the committee, it was decided to appoint two sub-committees, one to consider subjects of State interest and the other to take up subjects of municipal interest. The Committee on State subjects was authorized to prepare bills designed to embody the best safety and traffic ordinances already in force, and endeavor to have them incorporated into laws by all the States. It was considered advisable to take two New York bills as models, the one which directs that all vehicles shall carry lights, under penalty of a $10 fine, and the other, the law which applies to the operation of jitney buses. An outline of these recommendations will be presented for adoption at the first national convention of the Federation which is to be held in Detroit on October 20.

The law regulating the operation of jitney buses promises to receive much attention, for while each member of the Transportation Committee at this meeting naturally expressed himself as not favoring the innovation of the jitney bus, he conceded that it had the element of permanency in it, and must be considered with other trackless vehicle propositions. The Transportation Committee will work in conjunction with the Street Traffic Committee of the Federation, of which Commissioner John Gillespie of Detroit is chairman. Initial steps toward the standardization of traffic signs, signals, regulations and other subjects pertaining to uniformity in the handling of street traffic have already been taken. The kind of traffic signs employed, rules governing the movement of street cars and the operation of all types of vehicle, zones of safety for pedestrians and other subjects were among those considered.

As evidence of the lack of uniformity in street regulation, tabulations of the traffic rules now in effect in 50 leading cities form the basis of study and analysis by the committee for their information and guidance in the work of creating a uniform system. The near side stop for street cars has been adopted in 29 of the 50 cities; both the near and far side in 11, and the far side alone in only 10 cities. Lights are required on all vehicles in 37 cities. The police officials in 46 of the 50 cities agree that traffic officers should have the same control over pedestrians as they now exercise over the drivers and operators of vehicles. Forty-three police officials favor the use of safety zones for pedestrians at congested street intersections. Automobiles are required to stop behind street cars in 36 cities, and 23 cities prohibit the use of glaring headlights on motor vehicles. The officials in 36 cities believe that there should be a periodical examination of the equipment of motor vehicles, and 41 officials are unanimous in their opinion that all operators of motor vehicles, whether owners or chauffeurs, should be licensed. Only in 19 cities have cautionary signs been erected at the approach of public schools. In 37 cities the officials believe that horse-drawn delivery wagons should be equipped with brakes. The police department heads, commissioners and directors of safety in 48 of the 50 cities favor uniform regulations and have endorsed the "Safety First" Federation's plan to standardize traffic regulation.

It was decided to recommend to the "Safety First" Federation of America that the following be adopted for general use:

To have education and special instruction of policemen before assigning them for traffic duty.

Standard code of hand signals to be used by traffic officers.

Fixed locations for traffic officers at intersections to be distinctly marked.

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Elimination of glare of head and side lights.

Use of muffler cut-outs to be prohibited.

Standardization of left-hand turns at intersections.

Near-side stop for street cars.

Rear lights on all horse-drawn vehicles.

Elimination of steps on all horse-drawn and motor trucks.

Standard size, color, design, and means of attachment for all street traffic signs, including school, hospital, church, safety zones, fire hydrant, railroad and street railway crossings, alley, mail box, playground, cross-walk, parking, etc.

Designation of safety zones and cross-walks as embodied in the Detroit plan of painting.

Education of the public to use cross-walks at intersections and authorizing police departments to control pedestrian travel as provided in section 2 of the Detroit traffic ordinance.

Standard traffic ordinance and code of regulations for adoption by all cities.

Licensing of drivers or operators of all motor vehicles.

Exclusive use of siren whistles on police and fire vehicles.

Standardization of accident reports by municipalities.

Chain guards on vehicles driven by side chains.

The following subjects were discussed but action was deferred:

Prohibiting the interrupting of traffic officers while on their posts of duty to obtain information, and substituting central information bureaus for this purpose.

Hours of duty for traffic officers.

Rotary traffic.

Uniform rule to be adopted relating to clothing, platforms, and shelters for traffic officers.

Parking: Parallel, angular, 15 to 60-minute time limit.

Right-of-way; uniform rule to be adopted.

Following the morning session of the Transportation Committee, a luncheon was served to the members in the Republican Club room, at which Darwin P. Kingsley, President of the New York Life Insurance Company, presided. Those present were:

Darwin P. Kingsley, President of the Federation.

Charles L. Bernheimer, Treasurer, also President of the Safety First Society of New York.

Jefferson DeMont Thompson, Chairman of the Executive Committee.

Ralph Folks, Commissioner of Public Works, Borough of Manhattan, Chairman Executive Committee, Safety First Society.

A. Duncan Reid, Chairman, Casualty Insurance Committee.

C. Louis Allen, Chairman, Membership Committee.

Frederick H. Elliott, Executive Secretary of the Federation.

Francis X. Butler, Director, Bureau of Statistics.

George Keegan, General Superintendent, New York Railways Company.

J. A. Ritchie, Statistician of the Interborough Rapid Transit Company.

Secretary E. B. Burritt of the American Electric Railway Association.

H. W. Blake, Editor of the Electric Railway Journal.

Chairman C. Loomis Allen, President American Electric Railway Association.

W. E. Cann, Assistant to General Manager, Detroit United Railway, representing Safety First Society of Greater Detroit.

George Keegan, General Superintendent of Transportation, New York Railways Company.

Richard W. Meade, President, Fifth Avenue Coach Company, representing Safety First Society of New York City.

F. L. Hubbard, Assistant to General Manager, Toronto Railways Company, representing Ontario Safety League, Toronto, Canada.

T. C. Powell, Vice-President, Queen and Crescent Railway, Cincinnati, Ohio, representing Cincinnati Chamber of Commerce and Cincinnati Automobile Club.

John K. Punderford, Vice-President and General Manager, The Connecticut Company, New Haven, Conn., representing New Haven Chamber of Commerce.

C. R. Myers, Indianapolis, Ind., representing Indianapolis Chamber of Commerce.

James T. Moffet, Superintendent of Transportation, Washington—Railway and Electric Company, Washington, D. C., representing, Washington Safety First Association.

F. W. Bacon, Vice-President, Kentucky Traction and Terminal Company, Lexington, Ky.

J. W. Crawford, Supervisor of Claims, Philadelphia, Rapid Transit Company, Philadelphia, Pa., representing Philadelphia Street Traffic Committee.

H. B. Potter, Highway Safety League, Boston, Mass.

Fred James, Ottawa Electric Railway.

George A. Waters, Secretary, Detroit Police Department.

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Fig. 1. Drawbar swings too far around and catches switchman's leg.

ELIMINATING A DRAWBAR HAZARD.

The play of the drawbar, as shown in Fig. 1, is a source of hazard to the switchmen whose duty is to ride on the footboard, and it is also a hazard to anything or anyone standing near the track, as it extends beyond the clearance line of the locomotive and cars.

Both hazards were eliminated successfully, by the Inland Steel Company, by simply placing a pin at each side of the bar, as shown in Fig. 2 at "A." The pins were placed far enough each side of the center to allow the drawbar to play, without binding, when the locomotive is rounding a curve with its train.

Fig. 2. Pins placed to prevent drawbar from swinging around too far and catching switchman's leg.

EFFECTIVE GRINDER GUARDING.

That some of the railroads are doing great work in accident prevention, outside of transportation problems, is indicated in the accompanying illustration, from a photograph taken in the shops of the Baltimore & Ohio. The

Guarded Grinder.

emery wheel is guarded in an efficient manner. Goggles are furnished for operators. Conspicuous notices and warning signs are posted also, instructing the employes not to use the grinder without first protecting their eyes with goggles and cautioning them not to clean, oil, adjust or repair the machine while running.

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BOOKS.

SURE POP AND THE SAFETY SCOUTS. By Roy R. Bailey. Published under the auspices of the National Safety Council, Chicago. Publishers: World Book Company, Yonkers, N. Y.

About a year ago one of the members of the executive committee of the National Safety Council conceived the idea of the council preparing a textbook to educate school children in the principles of accident prevention. After considerable study and deliberation the executive committee of the council decided to present the necessary ideas in the form of a story book, and were lucky in discovering Mr. Roy R. Bailey, who became the author of the book. This is the first publication of its kind in the country. It is not a textbook, but a story book depicting a vivid series of everyday safety adventures. It is written for the young folks of both sexes between the ages of eight and ninety.

Mr. Bailey is a lover of children, a story writer, a hard-headed business man, yet a boy who will never grow up. He is the author of the "Ticklemouse Adventures," a series of bedtime stories which have endeared him to children and parents alike. "Sure Pop" has all the kindliness and charm of Mr. Ticklemouse —plus the truly compelling touch of Scoutcraft.

Bob and Betty, wide-awake twins just in the edge of their teens, plunge into a series of stirring adventures in safety through sheer admiration of Colonel Sure Pop, founder of the Borderland Safety Scouts. The impulse to imitate him is irresistible.

The adventures are so alive, so real, so full of action, that they exert a surprising degree of suggestion on the reader. There are adventures with a live wire, on the railroad, at a fire, in work shops and mills, and so on. In Bob's manly strength to win his spurs as a Safety Scout—in Betty's plucky determination to match up with her twin, what wonder that boys and girls will read into these adventures the conviction that they themselves are ripe for similar ones!

Without a single preachey line, this book gives the fundamental principles of safety and suggestions for organization of safety work in a way that no child can forget or fail to put into practice. The spirit throughout is optimistic, inspiring —the teaching is positive. This book is worth a thousand books of "Dont's."

An example of the efficacy of this book. One safety booster, who couldn't wait till the book was issued, read the manuscript, and at his first opportunity entertained the school children of a Wisconsin manufacturing town with these adventures. The children enthusiastically repeated the stories at home and pleaded with their fathers to "be careful at the mill." The fathers heeded, and a marked decrease in accidents was noted in a large paper mill.

The best and quickest way to instill the safety idea and habit in the public mind, *is to reach the children through their home and school reading.* Prominent educators who reviewed the manuscript say that "Sure Pop and the Safety Scouts" is admirably suited for both purposes.

Dr. Frank McMurry of Columbia University, an authority on school methods, says it bids fair to rank with "Black Beauty." A prominent Chicago teacher says that this book is certain to appeal to children, just as "Pinocchio" charms the fortunate youngsters who chuckle over the varied fortunes of the marionette.

The National Safety Council officially endorses and recommends "Sure Pop and the Safety Scouts" to everyone directly or indirectly interested in the promotion and education of safety.

REPORT OF THE BUREAU OF BUILDINGS, 1913. Borough of Manhattan, City of New York.

The report relates the particulars of the activities of the bureau, accompanied by tables of construction and inspection. The new building operations in 1913 were about $1,000,000 less than those in 1907, the poorest year since 1901. The number of proposed new buildings was considerably less than the smallest annual number since the organization of the borough department in 1902. The tendency in Manhattan in recent years has been toward a smaller number of new buildings, but of larger magnitude.

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MATERIALS, APPARATUS, PROCESSES

HARDY WELDING GLASS AND NOVIWELD LENSES.

The use of glasses to protect the eyes of those doing either Oxy Acetylene or Electric Arc welding is essential, as with the workmen looking directly at the brilliant flame, a degree of protection is necessitated as has perhaps never been demanded in the past for any occupational work.

The welding flame abounds in both Ultra Violet rays, the most harmful to the eyes, at the blue end of the visible spectrum, and Infra Red, or heat rays, at the red end of the visible spectrum. These rays, which are not perceivable as such to the eye, have a most injurious effect, and unless they are kept from entering the eyes harmful results must be expected.

Noviweld glass, which is employed for lenses in the Hardy welding glass, is designed to afford protection against the injurious rays, and possesses properties which absorb the Ultra Violet and Infra Red rays, passing freely all of the yellow rays, that is the light proceeding from the yellow and yellow green portion of the visible spectrum, thus giving high acuity of vision and allowing the wearer to see details, etc.

The Hardy Welding Glass.

It is claimed for the Noviweld glass that even in the lightest shade it gives adequate protection against the injurious rays; yet in the darkest shade it retains its remarkable definition and can thus be advantageously used by welders, and that with this glass it is only necessary to select the shade that gives the correct amount of illumination for different classes of work. While these lenses afford welders unusual definition no matter how continuously they are used, the user will have no sense of eye strain or fatigue.

The non-metal mounting or lens container of this glass has been carefully worked out. The material of which the eye cups are made is a non-conductor of electricity and heat, is non-inflammable and infusible, very hard and retains its finish. It is high in mechanical strength, will not warp or distort, nor absorb moisture, and is not affected by temperature below 300 degrees F.

The construction of the lens cups is as shown in the illustration. They are made so as to fit the curves of the face and to exclude outside light getting to the eyes, and there is a perspiratory outlet in each of the ventilating slots.

The Hardy welding glass is manufactured by F. A. Hardy & Co., 10 South Wabash Avenue, Chicago, Ill., who will promptly send full particulars concerning it.

GRAND PRIZE PANAMA-PACIFIC EXPOSITION AWARDED POWER'S CAMERAGRAPH NO. 6A.

The connection of motion pictures with the largest and most impressive of World's Fairs, the Panama-Pacific International Exposition, is interesting to note. It would appear from the numerous applications for space in the exposition for purposes of motion picture demonstration that a great majority of exhibitors had decided to use the most modern and up-to-date as well as educational method of presenting before the visiting multitudes the merit of their products and their strides in advancement.

The possibilities in this direction were limited but still permitted the use of many theaters daily engaged in interesting those seeking information in particular lines. One can enter comparatively few of the beautiful buildings without finding the motion picture screen with the machine busily grinding out what the exposition exhibitor most desires to present to the public.

As showing the diversified application of motion pictures in the demonstration of what is constantly occurring, and most interesting to the public, may be mentioned a range from the operations in the conducting of a mine to the performances of an aeroplane in mid-air; manufacturers showing the details in the preparation of their product; land development with all its accomplishments; conservations of our timber lands in the prevention of devastating fires as well as the development of new growth; action in the extraction of the earth's

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treasures, and the every-day happenings in large cities.

A very interesting exhibit shows the means by which animated photography is presented in its highest possible development, viz., the motion picture projecting machine at the Nicholas Power Company's exhibit.

The many years of time, labor and exclusive attention to this branch of the motion picture industry is not appreciated by the general public until it becomes acquainted with the highly developed machine construction as presented in Power's Cameragraph No. 6A. In the various exhibits throughout the exhibition grounds, there are 35 machines of this manufacture so used.

Exhibit of the Nicholas Power Company at Panama-Pacific Exposition, San Francisco. Power's Cameragraph No. 6A Was Awarded the Grand Prize by the Jury of Awards of the Exposition.

The general public as well as exhibitors and others vitally interested are becoming acquainted as shown by the never-ending stream of visitors at this exhibit asking questions and examining views of the largest factory of its kind in the world, listening with attention to the description of the plant necessary, and skilled work requisite, to the construction of this highly developed and very successful motion picture projection machine.

Appreciation was fully and clearly shown by the Jury of Awards of an International character, which awarded the highest possible honor ever given to a motion picture projecting machine at any World's Fair, the Grand Prize. Awards have previously been given to the Nicholas Power Company for its product by juries of domestic character, and the granting of this latest award to the efforts of a pioneer is a worthy appreciation of the many years of untiring devotion given to the development of the motion picture art.

The interest of the jury of award in the efforts of the "man behind the machine," was shown by a collaborative medal which was awarded to one of the many unheralded projection experts using a Power's Cameragraph, for the most perfect operation of a projecting machine.

FIREPROOF COLD WATER PAINT.

In all manufacturing plants lighting bills are a considerable factor in operating cost, hence a paint, which it is claimed actual service has proved, greatly reduces the cost of lighting has much to commend its use. When to this is added its low cost and fire-resistive qualities, "Safety First" men are at once interested.

The J-M Fireproof Cold Water paint, a product of the H. W. Johns-Manville Company, brightens up dark places and corners, thus extending the period of daylight and making fewer lights necessary for night work. It is composed of various minerals and cementing compounds, and is mixed, not with oil, but with ordinary water. Due to this fact it costs only a fraction as much as oil paints. It is claimed, it covers a greater area, one layer covering better than two layers of oil paint.

As the paint contains no oil, alkali lime or injurious chemicals it will not discolor with age nor harm hands nor clothing, and when applied according to simple directions it forms a hard, firm, sanitary and odorless coating which will not chalk, scale, peel or rub off. Hence is durable, and being fire-resistive it is approved by the fire underwriters. Insurance premiums are often reduced when it is used.

Descriptive literature of this paint is issued by the H. W. Johns-Manville Company and can be obtained from its representatives in every large city.

NEW MODEL BOWERS PROTECTIVE HELMET.

This helmet, for arc and autogeneous welders, is a decided improvement over the original aluminum helmet. It is now constructed of a special hard black fiber, treated to resist high temperatures and retain its shape. The greatest advantage obtained by

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the use of fiber for this purpose is due to the fact that fiber has a low heat absorbing characteristic, thus greatly reducing the temperature on the inside of helmet.

Temperatures on inside of metal helmets have been recorded as high as 300 degrees Fahrenheit, whereas fiber helmets doing the same work registered only a little over 100 degrees Fahrenheit. This is an important consideration in providing protection for arc and autogeneous operators.

Another very important feature of this

New Model Welder's Helmet.

helmet is that no matter how careless the wearer may be in allowing his helmet to make contact with the welding circuit, there is no danger from electric shock. Fiber being a non-conductor of electricity, this danger is entirely eliminated.

In regard to serviceability and "foolproof" quality, this fiber helmet is far superior to metal or wooden construction; it can be abused by bumping and falling and will not dent or lose its shape. There is far greater rigidity and stiffness with less actual weight than in the original helmet made of aluminum or wood and there is nothing to break, wear out or get out of shape. One of these fiber helmets has proved its worth in a large eastern steel foundry where it has been subjected to the heat rays of electric arc welding 24 hours per day for a period of over one year.

The cost of construction has been greatly reduced by the use of fiber instead of metal, thereby giving the consumer a better and more serviceable helmet for less money.

This helmet, after a thorough inspection and test, has been standardized by many of the leading steel mills.

The steel cylinder shown in the accompanying illustration is provided for the purpose of preventing the intense rays of light from striking the eyes of other workmen.

The Bowers Protective Helmet is manufactured and handled exclusively by the Julius King Optical Company of New York and Chicago, which will be pleased to send same to safety committees or reputable concerns for approval.

"ADJUSTOGLAS" SAFETY GOGGLE.

SAFETY ENGINEERING has on several occasions emphasized the importance of providing safety goggles which not only are furnished with the correct lens for the practical requirements, but which can be worn by the men with comfort. Manufacturers of industrial eye protectors have given careful attention to the comfort feature. Experience shows that men will not wear goggles which do not fit comfortably and an ill-fitting goggle will often prejudice the wearer against wearing goggles.

The Strong-Kennard & Nutt Company, of Cleveland, Ohio, is just now putting on the market the "Adjustoglas" Safety Goggle. In the designing of this goggle, careful attention has been given to comfort needs. Manufacturers claim that the adjustable bridge secures absolute comfort for the wearer. The distance between the lenses can be adjusted to any width and the lenses set close to the face or at a distance from it. The angle of the bridge can be changed so that it rides flat on the nose without cutting. This adjustment can readily be made by the wearer without the use of pliers. There is only one size of "Adjustoglas" which is adaptable for all size requirements. It is claimed that this goggle fits the contour of the head and face of any man, regardless of what that contour may be.

The glass used is a special, clear, white optical glass, free from imperfection and extra tough. The construction of the rims makes it very difficult to drive the lens through the rim.

SIGNS AND THEIR RELATION TO "SAFETY FIRST."

The judicious use of signs safeguards life and limb, and is a safe, sane and wise investment. In view of the Workmen's Compensation Act, they become an economic necessity to every employer.

"Danger, Warning and 'Safety First' Signs" is the title of an illustrated treatise on signs and their relation to "Safety First," issued by the Enameled Steel Sign Company, 222 North State street, Chicago, Ill., for free distribution on request.

This book contains over 100 illustrations in colors and over 500 signs are represented in it. It contains information on signs for

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mines, quarries, foundries, rolling mills, smelting works, machine shops, laundries, factories, elevators, electric plants, steam power plants, traction lines, railroads, steamships, traveling cranes, derricks, auto guides and warnings, schools, hospitals, and public buildings and is a complete and elaborate work.

The signs made by this company are sometimes called Porcelain Enameled Steel and are made by firing vitreous enamels into 18-gauge steel or iron under 1,800 to 2,000 degrees Fahrenheit and, therefore, they cannot fade, are permanent, rustproof, fireproof and weatherproof signs.

"Factory Signs and Slogans" and "Industrial Signs and Slogans" are interesting chapters of this book, which will prove of much service as a ready reference for "Safety First" needs and requirements in securing signs that will prove of lasting service.

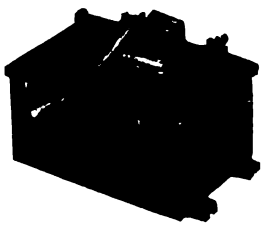
Signs like these prevent accidents, and save trouble and expense. Workmen who disobey signs of this nature and receive injury have only themselves to blame.

FIRST ELECTRICAL DEVICES TO RECEIVE UNDERWRITERS' NEW LABEL.

The Underwriters' Laboratories, Inc., have inaugurated a new label service called the Casualty Label Service. The most prominent casualty insurance companies, issuing policies under employers' liability and workmen's compensation acts, are subscribers to the merit classification service and accident prevention inspection of the Workmen's Compensation Service Bureau.

The Workmen's Compensation Service Bureau has established a very high standard and includes, in casualty insurance rates, a charge for all exposed and dangerous current carrying parts of an electrical installation. Devices labeled with the Underwriters' Fire and Accident label are not subject to charge under the analytic schedule of the Workmen's Compensation Service Bureau. While no special credit is given for the label, devices without this label may be charged for.

The Detroit Fuse & Manufacturing Company has been manufacturing enclosed electrical switches and motor starters for several years. It has always advocated the complete housing of all metal parts in electrical installations, realizing the danger of exposed live parts, both from the fire and the accident standpoint. Learning that the Underwriters' Laboratories, working with the Workmen's Compensation Service Bureau, were to inaugurate this new label service, the Detroit com-



The first electrical devices of the kind to be given permission by the Underwriters' Laboratories to use their new Fire and Accident Casualty Label Service.

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pany at once submitted its devices for examination and approval.

After several months' severe examination and tests, permission was given to use the new fire and accident label on Detroit Fuse & Manufacturing Company electrical switches. These are the first electrical devices of the kind to be given permission by the Underwriters Laboratories to use their new Fire and Accicent Casualty Label Service. The labels are numbered serially. No. 1 was issued to the Detroit company. Detroit Fuse & Manufacturing Company products now bearing the Underwriters' Fire and Accident label are "Square D" Steel Enclosed Switches, Detroit Ironclad Induction Motor Starters and Detroit Ironclad Switches.

The granting of permission to use the "safety" label reflects, in this case, the attitude of the Underwriters' Laboratories toward the importance of enclosing switches and cutouts.

DEVICE FOR AUTOMATICALLY CLOSING FIRE WINDOWS.

The closing of fire windows automatically under heat is demanded positively by the State department whose authority extends to the construction of factories.

Interior View, Showing Automatic Closing Feature.

Exterior View, Showing Moulded Staff Bead.

While the automatic closing of pivoted fire windows is readily accomplished, such closing of double-hung sash offers a more difficult problem on account of the increased friction and the difficulty of pulling up the top sash. In devices where this action is accomplished by dropping small auxiliary weights to engage with those of the upper sash, the percentage of efficiency is low as friction more than overcomes the added weight.

In considering automatic fire window closing equipment two factors should be considered—construction, workmanship, etc., should be favorable to the working of the automatic closing device without materially interfering with the easy operation of the window; the device should not detract from the weather qualities of the window. These are the factors that have always retarded the automatic closing equipment in connection with double-hung fire windows. Stephens patent automatic closing device for such windows is a radical advance in this line and has proved, in actual service, to be conclusively good and sure of operation.

Section Showing Application of Automatic Closing Device.

This device is manufactured by the S. H. Pomeroy Co., Inc., 282-296 East One Hundred and Thirty-fourth street, New York. The Pomeroy company is a pioneer in the manufacture of fire windows, having been engaged in this line of work almost from the introduction of wire glass by the Mississippi Wire Glass Company in 1897. The Stephens device employs the principle of transferring the weights used to counterbalance the lower sash to close by gravity; the top sash, being doubly weighted, must surely close and remain in that position.

This principle has been worked out in a conclusive way by a simple and ingenious device, easily accessible at all times, operating positively by the fusing of a link at any one of three points. The links are so distributed as to be susceptible to heat either from exterior or interior fires and in any position of the sash. The direct weight of the sash is taken off, the underwriters' approved fusible links by means of a patented weight reducing device which is most important in guaranteeing the life of the link for a long period of time.

As the purpose of a fire window is to protect the occupants of a building from an outside conflagration, or in case of a fire in a building, to confine as far as possible the damage ot building and contents, it is of the greatest importance that the workmanship of the sash and frame, and the dependability and simplicity of the automatic closing device, should be the best obtainable.

A Pomeroy No. 60 double-hung fire window, equipped with the Stephens' automatic closing device, was awarded a gold medal by the Universal Museum of Safety.

NON-EXPLOSIVE SAFETY CANS AND DEVICES.

The McNutt Non-Explosive safety cans and devices, designed to prevent the explosion of gasoline and other volatile liquids, which were awarded a grand prize by the American Museum of Safety and adopted

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by the United States Navy for use on dreadnoughts, cruisers, torpedo boats, etc., have proved their value in fire prevention.

When an ordinary gasoline container is exposed to great heat, the internal pressure is tremendously increased, and when this compressed gas is confined, the container is sure to explode. The principle employed in all McNutt cans and devices is to allow a gradual outlet for the expanding gas formed by great heat, so even in an intense fire, containers equipped with this McNutt device have not exploded.

These safety cans and devices are placed on the market by John C. Eames, Inc., 320 Broadway, New York, and a fully illustrated booklet is now issued describing the different styles for different purposes in which they are made.

THE "ARROBELL" PORCELAIN SOCKET.

The Arrow Electric Company, Hartford, Conn., has just placed on the market a new style of porcelain lamp socket designed for bathroom work and damp places where the Underwriters require a porcelain socket.

New Socket Designed for Bathroom Work and in Damp Places.

With this socket a husk and round glass globe is unnecessary, the socket being designed to be used with a G. No. 25 round bulb standard Mazda lamp. The lines of the socket harmonize well with this lamp and the round porcelain skirt of the socket gives the effect of a white enamel husk. The porcelain is pure white, nicely glazed and has an attractive appearance.

THE M. & M. RAIL CLAMP.

The M. & M. Rail Clamp commends itself in many ways as a safety appliance, and as a saver of time and labor. Originally designed for use in connection with railroad type steam shovels, where it met with instant favor under the severest conditions, its field has broadened to include the blocking of cars left standing on grades, the clamping of cars on car floats or ferries, and as a safety stop for the protection of workmen when repairing overhead cranes. This rail clamp is particularly suitable for blocking cars left standing on grades as it is a positively immovable stop, light to handle, yet adequately strong, simple and with no unattached parts.

It is self-adjusting without change of parts

Absolutely Safe Rail Clamp, Easily Applied or Removed.

to any rail of any cross-section, worn or new, ranging from 40 pounds to 110 pounds. A higher or lower range is furnished when desired.

The safety features of the clamp are self evident. Even where a derail is used, considerable damage may be done to life and property by a runaway car before the derail is reached, and the cost of re-railing cars will more than equal the cost of the necessary clamps. Again, the time lost by a switching crew in hunting up blocks, etc., will offset the cost of the clamps, which may be carried on the switch engine or locked to the switch block when not in use.

Used in connection with the repairing of overhead cranes to prevent other cranes on the same track from colliding with the disabled crane and endangering the lives of the workmen, this clamp has many advantages over the usual "home made" stop. The chief claim of superiority is based on the fact that this clamp is light, and can be quickly applied and released. For a short repair job, and considering the time and labor of applying and releasing the heavy "home made" stops, the workmen are apt to "take a chance" and omit the proper precautions. Granted that these precautions are necessary for safety, it must necessarily follow that the cheapest and most easily applied device that will present an immovable stop to the on-coming crane would be the most economical and efficient equipment.

Interested parties may communicate with the manufacturers, The M. & M. Rail Clamp Co., 102-104 W. Park Way, Pittsburgh, Pa.

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MISCELLANEOUS ITEMS.

The Pyrene Manufacturing Company, that makes one of the most valuable automobile accessories, the Pyrene Fire Extinguisher, is reciprocating with the automobile trade by motorizing its sales department. The company recently bought six automobiles for use at branch offices by salesmen, and not for deliveries. The company has used motor trucks in delivery for some time. The installation of the six automobiles is only the beginning of a general use of automobiles for its salesmen. Almost needless to say, each automobile will be equipped with a Pyrene Fire Extinguisher.

The Grand Central Palace in New York City has been converted into three motion picture theaters and, so far as arrangement and comfort devices are concerned, these theaters are superior to any similar amusement resorts in the world. The Palace is known as one of the largest convention halls in the country and when it was decided to turn this immense place into a series of motion picture theaters, six of the latest Power's motion picture projecting machines were installed. It is a matter of some note that this is the largest installation of that kind of machinery ever made under one roof. Of the six machines, four project the pictures from the rear of the screen and the other two from the front. The hall is lighted at all times and the pictures stand out with the greatest definition and clearness. Will C. Smith, recognized as one of the greatest experts in the country on anything pertaining to projection of pictures, had entire charge of the installation of the machines and he is receiving the congratulations of the moving picture trade on his wonderful success. This is one of the oddest theaters in the world, as in all three theaters there are different pictures and one may wander from one to another without extra charge.

RECENT CATALOGUES OF SAFETY DEVICES AND METHODS

By writing the firms the publications may be obtained without cost.
Please mention SAFETY ENGINEERING.

Asbestos "Century" Shingles.

Keasbey & Mattison Co.,
Ambler, Pa.

"How a Prominent Industrial Corporation Solved Its Roof Problem," is the title of a 12 page booklet of service to those seeking a solution to the great problem confronting every manufacturer and property owner today, Roof Efficiency.

Colored Lenses for Industrial Use.

Julius King Optical Company,
10 Maiden Lane, New York.

"Scientifically Correct Colored Lenses For Industrial Use" is the title of a new book which has been carefully compiled by Frederick W. King, manager safety department, of the above company, and treats the subject of eye protection against harmful light rays to which industrial workers are subjected. Mr. King has specialized for several years on the subject of eye hazards from dangerous light rays and how best this danger can be removed by correct lenses. The book successfully treats a scientific subject for the practical reader. Fifteen colored plates of exceptional clearness show at a glance the importance of the correct lens for preventing dangerous rays from reaching the eye. Colored plates were prepared by Professor M. Luckiesh, whose researches on light and spectacle analysis are well known. This book will be found valuable to every safety official in charge of eye protection. On request the above named company will be pleased to forward a copy without charge.

Danger and Warning Signs.

Enameled Steel Sign Company,
222 North State St., Chicago, Ill.

Booklet illustrated in colors, showing a few of the many types of enameled steel danger and warning signs manufactured by this company, and giving information of value to every employer anxious to save life and limb and the expense of damage suits.

Elevator Floor Stop and Lock.

Angell Elevator Lock Company,
370 Atlantic Ave., Boston, Mass.

Illustrated booklets describing Angell Elevator Safety Locks for all kinds and makes of elevators, open well, sliding or folding hatch, belt, hydraulic or electric, operated by hand pull shipper cable. The Angell Lock stops the car even with the floor the first time preventing seesawing back and forth to get the car even with the landing, and thus saves time, wear and tear to the elevator, while its safety features protect life, limb and property and prevent accidents. Angell noiseless passenger elevator lock is also described. Literature is of interest to all who desire "Safety First," and always, in elevator service.

Guards.

Lockhart-Hodge Company,
25 Waverly St., Buffalo, N. Y.

Folder giving actual examples of cases where the installation of Lockhart-Hodge guards have speeded up production and reduced liability insurance costs. Six illustrations showing these guards in use on belts of emery wheel grinders, foot pointers, shears, spindle-tappers, etc.

Pilot Lighting Plants.

Oxweld Acetylene Company,
36th Street and Jasper Place, Chicago, Ill.

"Evidence from Uncle Sam" is a story of the satisfactory service afforded in many of the United States Government Indian Schools by Pilot Acetylene Lighting Plants. Another publication of this company containing much of interest is "Safety of the Pilot."

Newman-Grille Watch-Clock.

Newman Clock Company,
178 Fulton Street, New York.

Booklet devoted to this watch-clock which has been described as "A positive check on human fallibility," and is used by the Bank of England, the Underwriters' Laboratories, the Yale & Towne Manufacturing Company, and a large number of the most important manufacturing and business concerns throughout the world.

Safe-Cabinet.

The Safe-Cabinet Company,
Dept. 1-6, Marietta, Ohio.

"Written in Letters of Fire" is a book of most striking appearance with cover of fire-red and jet-black, the contents of which treats in readable form the important facts in the history of the Safe-Cabinet from its inception down to the recent tests conducted in Marietta in January of the present year. A running account of a number of the important conflagrations through which the Safe-Cabinet has passed, affording complete protection to its contents, and a few extracts from the many letters written by owners whose property has been preserved from destruction by means of Safe-Cabinets are included in the publication.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

GROUND CLAMPS. Atlas Electric Co., 307 S. 5th St., Philadelphia, Pa. Ground clamp for use with No. 10 B. & S. gauge ground wire. A single-piece clamp of tinned copper, provided with suitably spaced holes and with galvanized bolt, nut and washer for clamping to rigid conduit. Adjustable for use with conduit up to and including 1-in. in size. One end of clamp is channeled to form equivalent of a lug for soldering to ground wire.

LAMP ADJUSTER. Indispensable Mfg. Co., 201 Flatiron Bldg., San Francisco, Cal. Adjuster forming a part of a chain fixture, consisting of a standard key socket, a length of portable cord, and a spring-controlled drum with pull chain ratchet. The ends of the portable cord are attached and connected in circuit through insulated brushes and contact rings. A 2-piece, formed brass shell supports and encloses the operating parts. The portable cord is guided through a large hole by a composition roller.

PANELBOARDS. Electric Apparatus Co., 127 S. Green St., Chicago, Ill. Panelboards shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters, and examined at factories and passed by Underwriters' Laboratories, have labels attached. This manufacturer is equipped to supply these panelboards so labeled.

PORTABLE ELECTRIC SAFETY LAMPS. Hirsch Electric Mine Lamp Co., mfr., 814-324 N. 12th St., Philadelphia, Pa. "Hirsch" Watchman's Lamp. Portable electric safety lamp, consisting of a lead plate, 2-V. storage battery enclosed in aluminum case. A small incandescent lamp, together with a special switch, safety glass and shells are mounted on the top of casing. For watchman's use. "Hirsch" Miner's Lamp. Portable electric safety lamp, consisting of battery, reflector, and safety features same as watchman's lamp. Battery is enclosed in a case for fastening to miner's belt, and reflector is designed to fasten to miner's cap. Electrical connection is made between the two by length of small armored cord and bayonet receptacles and plugs. For use in mines.

RECEPTACLES, FOR ATTACHMENT PLUGS. Cutter Co., Geo., mfr., South Bend, Ind. Receptacle base consists of a single piece porcelain on which are mounted three spring contacts. A hardwood plug is provided with contacts and lugs for portable cables.

REGAL BRAND PREPARED ROOF COVERINGS, 2 AND 3-PLY PATTERNS. H. W. Johns-Manville Co., Madison Ave. and 41st St., New York, N. Y. Prepared type, smooth surfaced. Single thickness. Attached by nailing. Limited to combustible and non-combustible roof decks capable of receiving and retaining nails and to inclines exceeding 3 ins. to ft. Coverings consist of sheets of Regal Roofing and flashings and trimmings of same material laid according to directions furnished. Roofing lapped 2 to 3 ins. at edges and ends. Fastened together and to deck with ¾-in. No. 10 galvanized roofers' nails spaced not to exceed 2 ins. apart or with 3 D galvanized nails driven through special galvanized iron cleats ½ in. wide and 6 ins. long and made tight with lap cement. Flashings and trimmings fastened to deck with nails and cleats. Coverings approximately 0.079 and 0.091 in. thick and weigh approximately 42 and 52 lbs. per 100 sq. ft. of finished surface, respectively, for the 2 and 3-ply patterns. Roofing 32 ins. wide packed in rolls containing sufficient roofing to cover 1 or 2 squares. Rolls weigh 38.5 to 45.5 and 77.0 to 91.0 lbs., respectively, for the 1 and 2 square rolls of 2-ply, and 47.5 to 56.0 and 95.0 to 112.0 lbs. for the 3-ply, exclusive of wrappers and trimmings. Directions for laying, nails and lap cement for applying supplied with each roll. These roof coverings are shown by tests and investigations at Underwriters' Laboratories to be not readily inflammable; to afford little heat insulation to roof deck; to carry and communicate fire to some extent when heated; to possess little or no flying brand hazard; to exert slight blanketing influence upon fires within buildings; to be durable under ordinary service conditions for periods in excess of 5 years and for longer periods if recoated with paint from time to time, and to fulfill requirements of classification given.

SWITCHES, AUTOMATIC. M. & O. Automatic Switch Co., Michigan City, Ind. Automatic time switch. This device consists of a cast-iron case enclosing an 8-day, 24-hour clock mechanism, arranged to operate a standard double-pole snap switch. 30 A., 250 V.

SWITCHES, AUTOMATIC. Snyder & Co., Owen T., Lynn and Ludlow Sts., Columbus, O. Safety Elevator Door Switch and Threshold Light. An enclosed duplex series spring opened switch automatically operated by elevator door. One side connected in series with car controller so that car cannot be started until door is properly closed. The other side is connected in series with threshold fitting for illuminating threshold of car when door is open.

SWITCHES, COMBINATION CUTOUT. Johns-Pratt Co., The, Hartford, Conn. The H. W. John-Manville Co., Sole Agents, New York, N. Y. Noark Service Entrance Switches. Cast-iron boxes, each containing two-pole, porcelain plug fuse cutout bases mounted on the inside of the box cover and provided with blades making contact with terminal clips, on porcelain bases secured to the bottom of the box, when the cover is closed. 30 A., 125 V.

SWITCHES, KNIFE. Electric Power Switch Control Co., 255 4th St., Portland, Ore. Motor starting switch control, 30 A., 250 V. 3-pole, double-throw knife switch with specially designed interlocking slot attachment to control movement of knife switch.

SWITCHES, KNIFE. Metropolitan Engineering Co., 1238-1252 Atlantic Ave., Brooklyn, N. Y. M. E. Co. A 3-pole switch, the blades consisting of cartridge enclosed fuses mounted on a hinged cover plate with handle whereby all can be withdrawn simultaneously when device is used as a switch. 100 A., 125-250 V.

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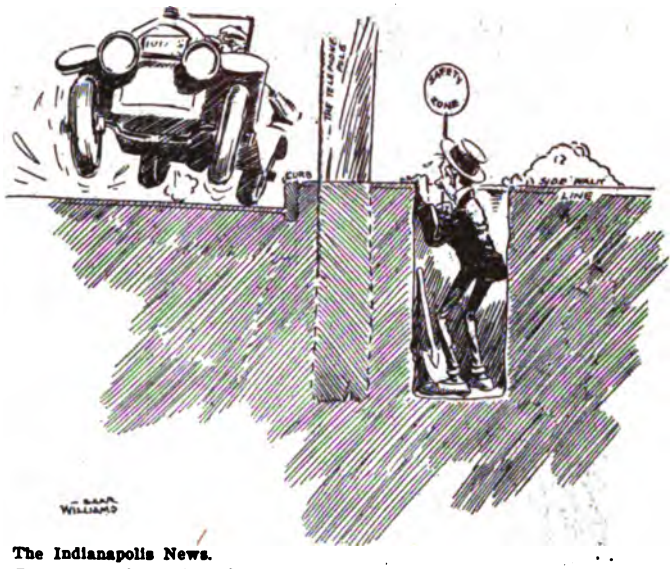
SAFETY ENGINEERING

Vol. 30 AUGUST, 1915 No. 2

Current Comment and News

EXPLOSIONS due to ammonia fumes are occurring too frequently. Two were reported in New York, within a few days of each other, a week or two ago, one at the Jacob Ruppert brewery, the other at the Hotel Biltmore. In the latter case a human life was lost, the electrician's. Neither explosion was accompanied by fire. Both accidents were due to the breaking of parts of the refrigerating plants, which allowed the ammonia fumes to escape, causing danger from asphyxiation until the escaping vapor was shut off by firemen protected by oxygen-fed helmets. Investigation by the fire underwriters' bureau of surveys of other accidents of this kind, during the past few months, has led to the conclusion that such fires, or explosions, are usually due to the presence of oil in ammonia gas, the oil being used somewhat extensively for lubrication and sometimes for cooling compressors. When not due to this cause, such explosions may be attributed to the possibility of the decomposition of ammonia, especially in the presence of an intense heat such as that of an electric arc light. The liberation of hydrogen forms an explosive mixture with air.



The Indianapolis News.

Cross section showing plan to intrench the citizen while waiting for the car or the jitney.

The "Safety First" Society of the City of New York, after a thorough investigation of street accidents covering several months, has asked the Board of Aldermen to pass ordinances providing for the elimination of dazzling headlights and sidelights on automobiles; requiring parallel parking at curbs for all vehicles of the delivery type; requiring the use of mirrorscopes on all vehicles operated in New York City; requiring owners of all motor vehicles with chain-drive to enclose the chains with suitable guards; making it a misdemeanor for any person to "hitch on" or trespass upon a motor truck or horse-drawn vehicle unless employed by the owner of such vehicle. When a motor vehicle is at a standstill and unattended it should be safeguarded and the society asks that an ordinance be passed requiring the following: The motor of a gasoline-propelled vehicle must be stopped; on electric motor vehicles the control handle or the current cut-off switch must be locked so that the vehicle is rendered inoperative; on all steam-propelled motor vehicles the throttle, or shut-off valve, must be locked, and the

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Evening Wisconsin.

The Eastland Case.

emergency brake on all motor vehicles must be properly set so as to prevent such vehicle from moving.

Fire departments in Indiana have found that one of the greatest menaces they have to confront in fighting incipient fires is gasoline stored above ground. This has led to a general crusade by the fire marshal of the State to put gasoline underground wherever it is kept in quantities. A general order was sent out to this effect, giving forty days in which to comply, the penalty for each day's neglect to obey the order being a fine of $10 to $50. Records in the office of the State fire marshal show that accidents from gasoline explosions are of almost daily occurrence, and in the great majority of cases the fires would be of comparatively small size if the oil were properly stored. Dealers in gasoline who are inclined to favor "Safety First" methods have in many cases provided approved modern underground storage tanks as a matter of safety. The storage of gasoline up to 10 gallons, in an approved safety can, is permitted above ground. Warnings against concealment of improper storage tanks have been given.

The company operating the Fifth Avenue bus line in New York City has equipped its vehicles with wooden fenders suspended beneath the bodies between the front and rear wheels. The company's engineers have been experimenting for several months with various types of fenders with a view to getting the most practical and at the same time the most efficient. The one finally selected is of a pattern similar to that used by the London Bus Company. It curves outward at the back so that the rear wheels are thoroughly protected. Accidents to pedestrians on account of these busses have been very few in New York. The mishaps that have occured have been rear wheel accidents in nearly all cases, the pedestrians walking in front of the rear wheel after the front of the vehicle had passed them.

Chambers of Commerce in all parts of the country are taking up the "Safety First" movement and inaugurating campaigns with a view to educating the people of their communities in safety methods. Among the latest to espouse

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the cause of "Safety First" is the Chamber of Commerce at Binghamton, N. Y. It has opened an exhibit consisting of more than 100 photographs and bulletins obtained from the National Council of Chicago. The exhibits are on a bulletin board 15 x 5 feet in dimension, and are changed from time to time. Each picture is typical of the ordinary conditions to be found in most American factories and industrial plants. They show the results of neglect in providing proper safety devices, and how lives and limbs have been saved by reasonable precaution on the part of employers and employes.

The Evening Sun, New York.

Always Room for One More.

With the view of reducing the large fire loss throughout the country plans for a nation-wide educational campaign were considered at a joint meeting of the fire insurance and fire prevention committees of the Safety First Federation of America, of which Darwin P. Kingsley is president. The purpose is to cause the enactment of fire prevention laws, the appointment of State fire marshals, new State building codes, to regulate the sale, storage, transportation and use of combustibles and explosives, and to make persons liable for loss to others occurring from fires caused by carelessness or criminal intent. An effort will be made to establish a national fire prevention day.

The Central Ohio Fire Chiefs' Association has been organized in Columbus, with Chief Charles J. Lauer, of Columbus, as president. The object is to form a combination of cities, similar to that composed of Boston and suburban cities, to render aid in cases of conflagrations. All hose couplings are to be standardized and interurban protection is to be brought under a system that cannot but reduce the future fire losses within the jurisdiction of the association. An understanding is to be had as to who shall make the call for assistance, fix the time for loading apparatus and prepare rail and motor routes. Both the fire prevention association and the Ohio Inspection Bureau are lending the new plan all the aid possible.

The laws are seriously deficient in many important respects, from a fire prevention standpoint, in Pittsburgh, according to the National Board of Fire Underwriters. The building department endeavors to enforce the laws but lacks sufficient qualified men. The fire limits are sufficiently inclusive, except where recently reduced. Shingled roofs are permitted in large and indefinitely designated parts of the city. Structural con-

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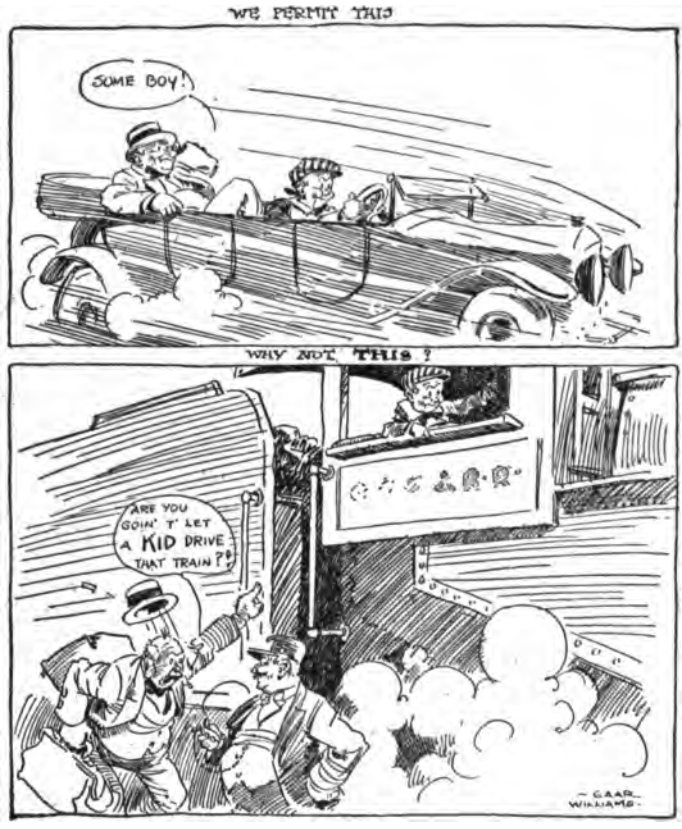

The Indianapolis News.

ditions are somewhat improved by an increase in fireproof construction and by a few additional sprinkler installations. Laws fail to control the ordinary hazards, particularly of gasoline and film storage. Wires are mainly underground in the congested value district and parts of other mercantile districts, except trolley feeders and service wires, which form obstructions. In the congested value district poor structural conditions make serious group fires probable, though normally they should not pass beyond control; but in most of the districts a fire once well under way during a high wind could involve several blocks. Several barriers formed by fireproof and sprinklered buildings should prevent it from sweeping the entire district. The North Side mercantile district has a high potential hazard, but normally a fire should not get beyond control. In other mercantile districts group fires only are probable. Manufacturing plants are mainly of low combustibility, or are sprinklered. Some residential sections have a high hazard.

NATIONAL SAFETY MOVEMENT.

It goes without saying that unless the employer has done considerable work along the line of guarding points of danger with mechanical guards he is in no position to ask his workmen to co-operate in promoting safety.—*C. M. Price.*

The Standard Oil Company at its Bayonne, N. J., plant, insists on its employes first learning English, and if they fail to follow that instruction they are dismissed. They can attend the public school or learn at the plant.—*H. H. Wheaton.*

The plan of "Safety First" meetings should be encouraged to give to workers opportunities to absorb new ideas, exchange experiences and discuss dangerous conditions; but, in order to popularize the meetings, it is more prudent to invite rather than to demand attendance.—*Richard Hoag.*

The time has come for the safety movement to settle down onto a solid rock foundation. Much of the hurrah is a think of the past.—*Frank H. Trego.*

I believe putting men who show antagonism toward the safety movement on the safety committees is a good idea.—*C. S. Whitney.*

The greatest hazard of the oil heater is in the very quality that makes it useful, its portability.—*Charles E. Worthington.*

The necessity for fire prevention will be as great twenty years from now as it is today.—*James A. Tierney.*

Fire and panic prevention in public places may be divided under three headings: First, proper designs, construction and equipment; second, proper inspection and supervision; third, sane and thoughtful management.—*John J. T. Waldron.*

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THE EASTLAND DISASTER

By R. W. Hicks.

THE overturning of the steamer *Eastland* in Chicago River on Saturday, July 24, which sent a thousand workers to an untimely and unwarned death, comes to us as a most horrible revelation of negligence and laxity, a grave disobedience of the fundamental principles of safety.

The boat, which had been chartered by the Hawthorne Club, an organization of employes of the Western Electric Company at the Cicero plant, for an annual outing to Michigan City, was lying at her dock loaded with human freight, waiting for the captain's order to cast off on schedule time. She was scheduled to leave at 7.30 a. m. from her dock, on the south side of the Chicago river just west of the Clark street bridge, and, according to the government's rating, was authorized to carry 2,500 passengers. At the time of the accident she had a full load of men, women and children aboard. The tug which was to tow her out of the harbor was standing by with tow line fast but slack, waiting for the signal to start. The bow line was still fast to the dock and the stern line had just been cast off, when the boat, which was listing to port at a critical angle, turned on her side, away from the dock, and settled in the Chicago river, dumping part of her human load into the river and imprisoning hundreds more within the hull in staterooms, saloons and dance halls.

Some of the facts are still unknown; others are guarded as secrets by the Federal investigators; but certain important ones that are known indicate that this tragedy was a horrible realization of hazards which, possibly, exist in other boats and which may be revealed in a similar manner at any moment, unless the lessons are heeded and steps are taken to correct the faults of existing and future excursion boats in particular, and of all passenger boats in general.

The *Eastland* was designed and built by the Jenks Shipbuilding Company, Port Huron, Mich., for the Michigan Transportation Company, in 1903, under a contract in which speed was the prime factor. The contract price of $235,000, provided that the finished boat, without the aid of forced draft, should "maintain a speed of 20 miles an hour for four hours under test," with a penalty for a less speed and a bonus for a greater speed amounting to $2,500 for each quarter mile per hour under or above the contract speed. Reference to safe carrying was omitted, but the original plans showed approximately 100 staterooms. Other specifications were executed in such a way that when finished the boat received the highest rating of star and crescent 100 in the Great Lakes Register.

Under the pressure for the demand for speed the boat was designed and constructed to carry no fixed ballast, depending entirely on water ballast to hold the vessel upright when loaded. This water ballast was, of course, easily removable, which, on account of that fact, was often done, usually causing the boat to list more or less. At one time in July, 1904, when carrying 2,142 passengers, the list became so great as to cause a panic. (The boat had a rating of 3,300 at that time.) The following article from the Chicago *Tribune* of July 18, 1904, describes the conditions then existing:

SCARE ON BOARD A STEAMER

USE OF FIRE HOSE IS FOUND NECESSARY TO RESTORE ORDER ON THE EASTLAND.

Lack of the usual amount of water ballast and an exceptionally large crowd of passengers on the steamer *Eastland* combined to cause much uneasiness on the return trip from South Haven last night. When the homeward voyage was begun, late in the afternoon, all passengers tried to find seats on the shady side of the boat. This caused the steamer to list heavily to starboard. Members of the crew hastened to close the lower portholes, while many women secured life preservers and crowded to the steamer's rail, with the frightened men and women.

This caused the boat to settle farther to starboard, and some of the passengers became thoroughly alarmed.

The crew was at once mustered by the officers, and an attempt was made to reason with the frightened men and women.

The passengers refused to obey orders and

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The Eastland three minutes after the accident of July 24. Notice passengers still in the water clinging to wreckage and smoke from Eastland's funnels not yet blown away.

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finally, in order to drive them away from the rail, the fire hose was used. It proved effective and the crowd went to the lower deck.

The women were persuaded into the smoking room of the cabin, and were reassured by the officers, while the men were talked to outside by other members of the crew. The ship held to its course despite the petitions of the passengers to turn around, and reached Chicago at 11:30 o'clock. Many of the women insisted on wearing life preservers until the vessel reached its dock.

Frank Dority is the captain of the *Eastland*, and Albert Jacobson is the first officer. The explanation of the careening given by the officials of the company is that on account of the shallowness of the water in the South Haven harbor, the 6,000 tons of water ballast was discharged. When the boat left the chambers had not been filled, and as the boat was loaded unevenly, it listed to starboard.

This and other bits of history had won for the *Eastland* the title of "crank of the lakes." The indications are that the ten water ballast tanks, considered essential for stability and safety, were not filled except after the occasion demanded and that even then they did not respond as quickly as they should.

In spite of these facts the boat continued to operate with the Federal government's approval in and out of Chicago, with varying capacities, according to certificates as follows:

Date.	Passengers and Crew.
July 8, 1903.....	2,800
June 24, 1904.....	3,300
July 26, 1904.....	2,800
July 23, 1905.....	2,907
June 18, 1906.....	3,000

In 1907 the *Eastland* was sold to the Eastland Transportation Company of Cleveland for operation as a passenger and excursion boat on Lake Erie, but here the inspectors were not so generous in their ratings and allowed only 600 passengers when the trip carried the boat outside the five-mile limit. The boat continued to navigate in such a manner as to be regarded by seamen as "cranky" but, fortunately, without a mishap. In 1914 it was again sold, this time to the St. Joseph-Chicago Steamship Company for $150,000. The buyers were aware of the fact that it was a "bargain counter" boat and made an investigation to find out why. The result of the investigation did not prevent the sale, however, nor cause material changes in construction. The new owners increased their capital stock, insured the hull and started operations to make money. They received the following capacity ratings from government inspectors:

Date.	Passengers and Crew.
June 8, 1914.....	2,120
June 12, 1915.....	2,253
July 2, 1915.....	2,570

This covers briefly the history of the *Eastland* up to the fatal date of capsizing. The organizations and personnels which are directly interested and undergoing investigations as a result of the accident are as follows:

Eastland Owners:
- St. Joseph-Chicago Steamship Company, St. Joseph, Mich.
- Geo. B. Arnold, president.
- Wm. H. Hull, vice president and general manager.
- Walter C. Steele, secretary.
- Ray Davis, assistant general manager.
- Martin Flatow, general agent at Chicago.

Lessees of the *Eastland* for July 24, and parties to the contract with Hawthorne Club:
- Indiana Transportation Company, Michigan City, Ind.
- S. W. Larsen, president.
- W. K. Greenebaum, general manager.

Boat Officers and Employees:
- Harry Pedersen, captain.
- Delbert Fisher, first mate.
- J. M. Erickson, chief engineer (son-in-law of Inspector Reid).
- C. F. Silvermail, first assistant engineer.
- Fred G. Snow, second assistant engineer.
- John V. Elbert, ship ganger.
- Peter Erickson, oiler (brother of the chief engineer).

Government Inspectors:
- George Uhlers, supervising inspector-general, Washington, D. C.
- Charles H. Wescott of Detroit, supervising inspector eighth district (eighth district includes Lake Michigan).

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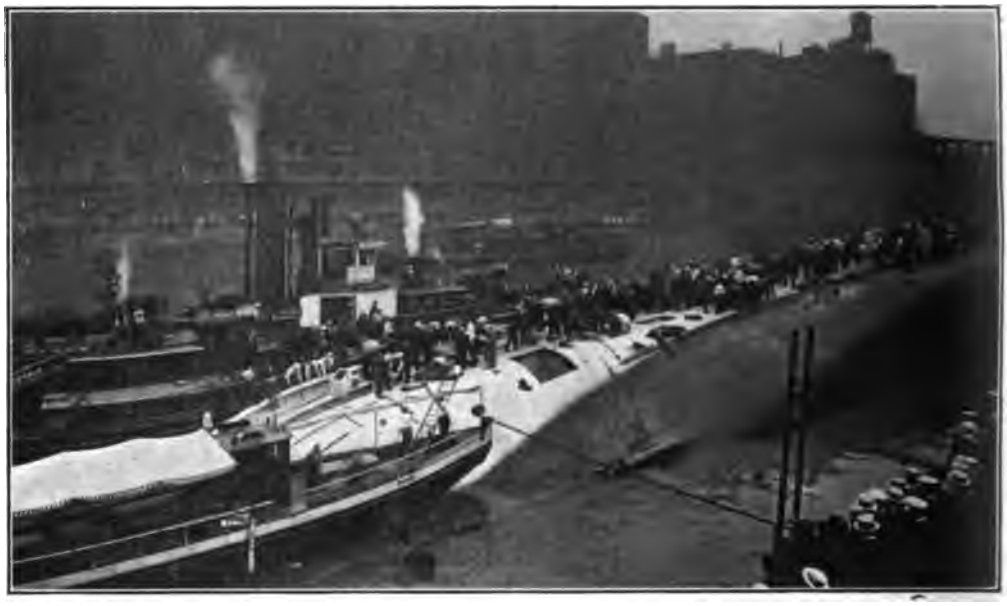

View of the Eastland at 8 a. m. About 20 minutes after the boat turned over.

Robert Ried and Charles C. Eckloff, local inspectors of Grand Haven, Mich., who pronounced the *Eastland* safe for passengers, May 7, 1915.

Ira B. Mansfield and William Nicholas, Federal inspectors at Chicago, who certified the *Eastland's* hull was seaworthy, July 6, 1915.

The fact that the *Eastland* was regarded as a "ticklish" boat can be no better displayed than by the following correspondence which has been made public:

General offices St. Joseph-Chicago Steamship Company, St. Joseph, Mich., June 25, 1915.—Hon. W. C. Redfield, Secretary Department of Commerce, Washington, D. C.—Dear Sir: I wish to register a protest against the seamen's bill being made effective on Nov. 4 next. I am confident that the disastrous effect of this bill to American steamship lines is (sic) already apparent to everyone, and believe that an opportunity should be given to have this act modified or entirely canceled. I will thank you to acknowledge receipt of this letter and advise what is the present attitude of your office toward this bill.

W. H. HULL.
General Manager.

Washington, D. C., June 28, 1915. W. H. Hull, general manager, St. Joseph-Chicago Steamship Company, St. Joseph, Mich.—Dear Sir: Your favor of the 25th inst. is received. It is little difficult to see how your request can be carried out without involving me in a flat breach of my oath of office, which is to enforce the law. Power is not given to me to say what laws shall be obeyed and what shall not be obeyed. It is therefore my purpose as a matter of duty to enforce the Seamen's law when it shall become active.

You do not make clear the basis of your protest. What is it specifically in the law to which you object? No steamship company or owner has as yet suggested to me anything to show what you call "the disastrous effect of this bill."

WILLIAM C. REDFIELD,
Secretary of Commerce.

St. Joseph, Mich., June 30, 1915.—Hon. William C. Redfield, Secretary of Commerce, Washington, D. C.—Dear Sir: Replying to that portion of your letter of June 28 in which you ask, "What is it specifically in the law to which you object?" I can answer this in no better way than to state the effect it would have in the operation of our S. S. *Eastland*.

This boat is operating this season from June 12 to September 8, inclusive, is licensed to carry 2,570 people, is equipped with life preservers for that number of people and has life rafts and life boats capacity under the last inspection for 771 people.

In order to keep its maximum carrying capacity at the present figure, we would have to increase its equipment in life rafts and life boats 66⅔ per cent.

This is a physical impossibility.

If it were possible to put this amount of equipment on the Eastland the weight that would be added to its upper deck would make the boat difficult to handle.

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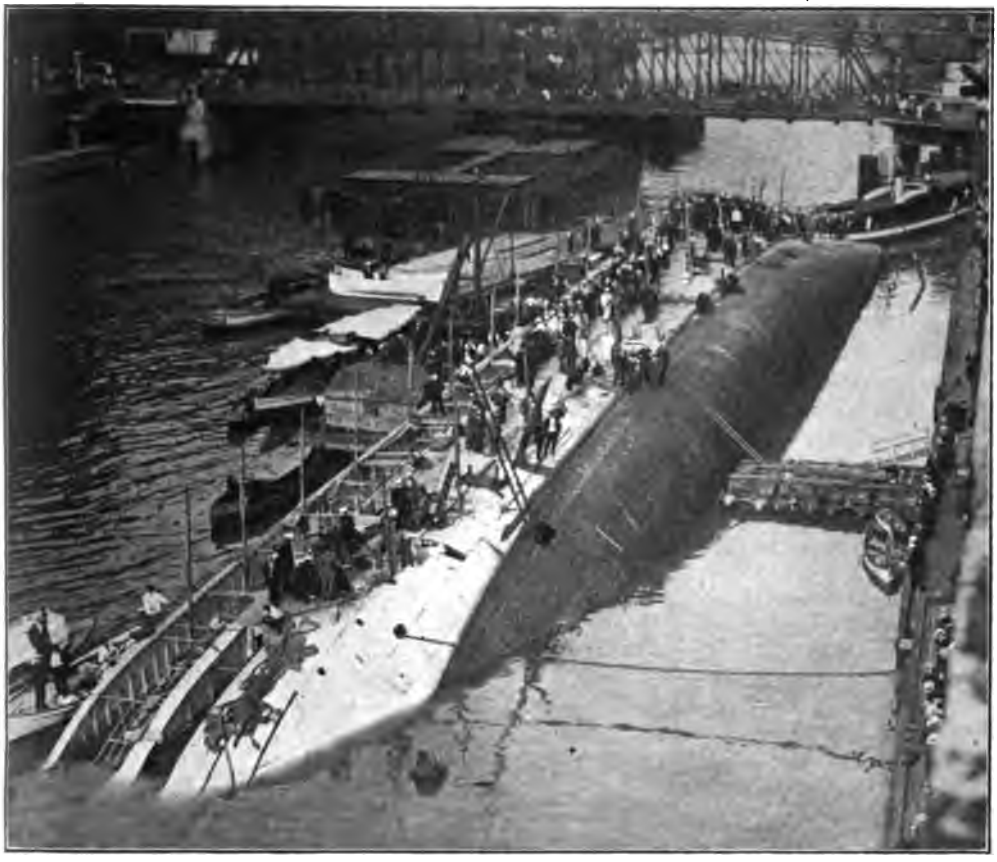

Photo by International News Service.

Another view of the Eastland shortly after the disaster.

If our life saving equipment is allowed to remain as it is at present our carrying capacity would be decreased 40 per cent, or 1,028. You can see that a daily reduction of 40 per cent in carrying capacity would amount to considerable during the season in operating revenue.

The requirements of the seamen's bill relating to certificated lifeboat men and able seamen would increase the number of our crew and would afford an opportunity to able seamen to fix an arbitrary wage and tie up the boat without provocation.

I realize, as you state, that it is your duty merely to enforce the law, but I have taken the liberty of stating to you that we specifically object to that portion of this law relative to life saving equipment, able seamen, and certificated lifeboat men, and give the reason therefor in answer to your above questions.

W. H. HULL, General Manager.

Washington, D. C., July 14, 1915.—W. H. Hull, St. Joseph-Chicago Steamship Company, St. Joseph, Mich.—My Dear Sir: I appreciate your writing so frankly on the 30th ult. in response to my letter of the 28th, in which I ask what is it specifically in the seaman's law to which you object.

Speaking candidly, it seems to the writer personally, and without criticism of your present course, which is permitted by the lawful authorities, that the existing conditions permit greater risk of serious loss of life and less protection against same, either for you or for the public, and that the requirements of the seaman's law, however temporarily difficult, are in the interests of public policy and of public safety.

WILLIAM C. REDFIELD.
Secretary of Commerce.

To say the least, this is interesting correspondence in view of what happened. The history of the boat, given above, is of extreme importance in considering the cause of the accident as well as in establishing responsibility for the accident. It is interesting to note how the carrying capacity of the boat varied

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without any change in construction or equipment except in life preservers. This can be explained as resulting from different "opinions" held by different inspectors, or by the same inspectors at different times; and the lack of specific rules based on the boat's performances as regards stability. There appear to be no rules for the guiding of inspectors except that a life preserver must be provided for every passenger and member of the crew and life rafts or boats for 30 per cent of the crew and passengers, and a general understanding that it requires about 9 square feet of deck and saloon space for every person. But even that is not a rule to be enforced rigidly; it may be varied at the will of the inspector.

Another condition revealed by the investigations is that ship-builders and designers are not examined by Federal government or State authorities, but are assumed to be competent and to regard public welfare as more important than personal gain. Therefore, their ships are not examined or tested for stability or given a limited capacity rating as a result of test conclusions. Neither are the operators of boats required to show the safe capacity, by test, of any craft before operation. Inspection departments, we are told, "have no authority, money or men" to carry on such extensive investigations. The inspectors' duties consist simply of examining the component parts of boats and equipments, rating the boat for carrying capacity, then counting the passengers and preventing more than the predetermined number from entering the boat at one time. They have no authority to demand water ballast tanks to be filled before the boat is loaded with people, even though the stability of the boat is dependent on these tanks. They have no authority

Photo by Underwood & Underwood, N. Y.

Divers at work in the hull of the Eastland, searching for victims, days after the disaster. At the right are seen benches on which many of the passengers sat and from which they were thrown into the water.

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to demand that water ballast be replaced with fixed ballast, when the load consists of human beings, yet they have authority to receive and grant requests for increased ratings, as was the case in the *Eastland's* latest rating, when her capacity on July 2, 1915, was raised from 2,253 to 2,570.

Passing on from the history and the reputation of the boat, and some of the surrounding conditions, to the accident itself and the events immediately preceding, according to the latest obtainable information, the ballast tanks were pumped out about 6 o'clock on the morning of the fatal day, which was customary for the *Eastland* when in port in Chicago and South Haven. The engineer's account gives the following records:

A. M.

6.40—Water runs into No. 2 starboard tank.

6.53—A slight list to port. Water runs into No. 2 starboard tank for about 2 minutes.

6.55—A messenger sent from engine room to the purser to inform passengers to go to the port side. Boat returned to even keel.

7.16—A slight list to port. Nos. 2 and 3 starboard tanks partly filled.

7.20—Warmed up both engines.

7.25—Heavy list to port.

7.27—List grew heavier and a few minutes later went over.

The boat overturned between 7.30 and 7.40, which would give 5 or 15 minutes between the time noted when list was considered dangerous and the time the boat went over. The captain and crew were aware of the dangerous condition. The second assistant engineer stated that he had been employed only two days before the accident and had had 15 minutes' instructions in the operation of the ballast valves, which operation was included in his duties. Recent evidence reveals:

Coal was stored unevenly, the port pockets containing about 80 tons while the starboard pockets contained 25 tons;

The boat was drawing 13 feet 6 inches of water aft and about 9 feet 6 inches forward;

Two of the 10 ballast tanks were being filled;

The tug was standing by;

The gangway had been hauled aboard, 2 or 3 minutes before;

The stern line was loosened, the bowline was holding;

The crew had been warned of their danger, the passengers had not been warned;

The *Eastland,* with 2,500 souls aboard, rolled over away from its dock in 20 feet of water.

Half of the hull, which was 369 feet long and had a 38-foot beam, and one of her twin screws, appeared above the water and served as an island of safety for a few who climbed over the rail as the boat turned. The port sides of all decks plunged into the river carrying with them nearly 2,300 people, cast to the mercy of 20 feet of water or trapped within the hull like rats, to perish, to pay the penalty of somebody's negligence.

Hundreds were cast into the water and made use of any floating or stationary object to keep their heads above water until they could be rescued. Hundreds of others were trapped below the decks or inside the compartments without hope of ever seeing daylight again—a sacrifice to ignorance and neglect, responsibility for which is not yet established.

The first scenes of horror, however, eventually gave way to new ones when oxy-acetylene torches were started to open up the hull. At this point the captain of the overturned boat, who was conspicuous by his absence a few minutes before, appeared on the upturned hull and ordered them to stop their work of destruction of property. A few cool heads saved him from a more grewsome death than anyone else had experienced that morning, and the torch work continued.

Hundreds were rescued through the sides of the boat in this manner and bodies were taken out to be sent to temporary morgues and await identification by friends or relatives.

Divers performed their work inside and outside for more than a week, bringing up hundreds of dead and a few persons, who by reason of their location, still had enough life within them to re-

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ceive artificial respiration and recover. One man was removed after three days of imprisonment above the water level of the river and was revived.

Rescue work was continuous, day and night, some of the rescuers working 36 hours on a stretch.

The aftermath of this colossal tragedy with its revelations of heroism, grief, sorrow, cowardice, graft and crime is yet to be told. Let it be hoped that the investigations will result in steps being taken to endow somebody with the "authority, men and money" to forestall a similar slaughter in the future.

A PAPER COMPANY'S FIRE BRIGADE.

The hot weather has brought with it a fire hazard which all wood and lumber industries dread and must prepare to fight, a Wisconsin paper company asserts. Since part of its paper mill is similar to the lumber industry it must prepare to fight the fire hazard; but its pulpwood piles and wood room are not the only points which need protection. The rest of the plant and the village property depend entirely upon the fire protection which the paper company alone can give them.

The buildings of the plant are constructed of fireproof material and regulation fire doors separate the different rooms, therefore fires can be localized by the shutting of the fire doors. The sprinkler system is to be depended upon in case of serious fires in any part of the plant, and numerous chemical extinguishers in various parts of the mill should take care of any small blaze.

In the wood yard, the extended pipe line, a large number of water-filled barrels and fire buckets are inspected and refilled periodically; and to take care of all this equipment, to be prepared for any fire-fighting emergency, the paper company has a fire brigade with an equipment of hose, hose-carts, hydrants, hydrant houses, lanterns, ladders, etc. Weekly inspections maintain the good condition of the equipment. The fire brigade, as an organization, was created and became part of the "Safety First" campaign about a year ago. Since that time it has been drilled and perfected.

The paper company points out that while it has at hand the means for fighting fire and for saving life and property, it is the object of the safety campaign to prevent the starting of fires and to eliminate danger to lives and property:

Teamsters should not dump hot ashes upon any inflammable rubbish.

Don't keep unbaled waste paper heaped up to any large extent.

Don't smoke in the parts of the mill prohibited by the central safety committee.

Don't allow strangers to smoke where our employes have been forbidden to smoke. This is especially necessary in our wood yards.

Don't be careless with lighted matches.

Don't throw greasy or oily rags into corners where they may be ignited by spontaneous combustion.

Report unsafe flues at your homes.

Don't store gasoline where it is liable to explode. Note the method of storing gasoline adopted by the safety committee at the mill.

Do not use stove polish while your stove is hot—some polishes contain benzine.

All stairways, landings and passageways should be kept free from waste and rubbish.

Steam or hot-water heating pipes should not be placed close to timber or woodwork unless same is protected by metal shield.

Do not keep paints, painting material and rags wet with oil or turpentine inside the house.

Do not tamper with electric wires and apparatus unless you are an electrician.

Do not leave the current on when the electric iron or device is not in use, and place the iron on a metal stand.

Do not change the wiring or attach electrical devices yourselves. Get a competent and reliable electrician.

The chief of the mill fire brigade, reviewing the past year, notes that much has been accomplished in furthering the efficiency of the body of men forming the fire brigade. Equipment for fire fighting which had been scattered in out-of-the-way places was collected, overhauled and placed where it could be readily handled and be of greatest benefit in case of a blaze. New hose was purchased and hose-carts were repaired and fitted for service. Two houses were built for storing fire fighting equipment, and 1,300 feet of pipe line was laid through the pulpwood yard.

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Explosions and Fires in Refrigerating Machinery Rooms

Special Report by F. J. T. Stewart, New York Board of Fire Underwriters.

AN unusual number of explosions or ruptures recently in connection with refrigerating systems has served to call attention to the action of ammonia fumes when thus suddenly released from the customary pressure of 125 to 175 pounds. It appears that in most cases, explosions of varying intensities, or at least fire resulted directly or indirectly from the presence of the released ammonia vapor. The commonly accepted explanation of such fires or explosions has been that they are due to the presence of oil in ammonia gas, the oil being used somewhat extensively for lubrication and sometimes for cooling compressors.

By way of accounting for explosions of ammonia vapor suddenly released from high pressure, when not attributable to the presence of lubricating oil, it has been suggested that decomposition of the ammonia might take place, especially in the presence of an intense heat such as that of an electric arc light, resulting in the liberation of hydrogen which forms an explosive mixture with air. It has also been suggested that certain impurities in the ammonia might increase the tendency to decomposition or explosion. In a number of the cases reported herein a definite explanation of just what caused the explosion of the ammonia vapor seems to be impossible, but the facts as nearly as can be ascertained are submitted.

The practice of testing refrigerating systems with air pressure is especially hazardous, unless all oil is thoroughly removed from the entire system and great care is taken to prevent overheating of the air while being compressed. The last explosion herein reported was due to this cause.

MANHATTAN REFRIGERATING COMPANY, NEW YORK, APRIL 26, 1915.

The refrigerating plant is located on the first floor of Section D and parts of the refrigerating machinery extend to the second and third floors. Parts of the second and third floors were also used as pipe fitting and repair shop, with open coal forge on third. The fourth, fifth and sixth floors were used for cold storage rooms. The boiler plant was in the basement.

About one p. m. a noise described as "a puff," emanating from the second floor, was heard by the engineer and other employes. The trouble was caused by the breakage in a pipe connection on second floor between the analyzer and the rectifier of an absorption type refrigerating system. Immediately afterward a considerable number of glass windows in the front wall of the building were blown out. According to information received, a mild explosion occurred about five minutes after the accident. The ammonia gas had spread rapidly and reached the open coal forge on the third floor, which may have caused this explosion. Apparently the rush of gas scattered the embers of the forge, which resulted in a fire in workmen's coats hanging nearby. The fire also scorched some temporary wooden shelving which had been erected in the vicinity. Two automatic sprinkler heads also opened at this location and apparently extinguished the fire, as no water was used by the fire department. The sprinklers are said to have operated about fifteen minutes. An employe working on the roof claims to have extinguished some fire around the woodwork by means of a pail of water. There was some damage to the switchboard on the first floor, apparently caused by water discharged by the sprinklers or possibly by the ammonia.

It seems difficult to account for the mild explosion alleged to have occurred about five minutes after the accident. One theory advanced is that the fire in the forge exploded a mixture of am-

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monia gas containing various impurities; the explosion can hardly be attributed to oil in the ammonia, as this was an absorption system. The force of the explosion is supposed to have spread the embers from the forge and ignited the combustible material in the vicinity and that this fire caused the two automatic sprinkler heads to operate.

H. C. BOHACK & CO., RETAIL GROCERIES, AND PROVISIONS, BROOKLYN, APRIL 23, 1915.

The refrigerating machine in this case was a 6-ton Brecht compressor driven by belt from a 15 h.p. direct current electric motor, and was used for cooling meat boxes, etc., by the direct expansion of ammonia through coils therein. The cylinder was cooled by water jacket around the cylinder head. Oil was used only for lubrication. The machine was not operated continuously and it was the practice of one of the employes to take charge of the system. It was usually started every morning; an engineer being employed to give advice and occasionally special assistance when needed. At 10:30 a. m., after the machine had been in operation about two hours, the cylinder head blew off with a violent explosion, breaking nearby windows and blowing down a 4-inch tile partition adjoining the machine. There was no fire or evidence of any explosion resulting from the gas after it was liberated. The room was lighted by incandescent electric lights. The only possibility for any spark was at the commutator of the direct current motor.

It is difficult to account for the blowing off of the cylinder head, other than as the result of some mechanical weakness, or the presence of liquid ammonia or oil in the cylinder. It is claimed that there had been no testing of the system with air, which is a dangerous practice. This is one of a few cases where no fire or explosion seems to have resulted from the liberation of ammonia fumes, presumably mixed with lubricating oil. The lack of an open fire or spark may account for it.

MAYER BREWING COMPANY, NEW YORK, APRIL 11 AND APRIL 21, 1915.

The refrigerating plant, which in this case served a brewery, consisted of a 55-ton Linde and a 110-ton Vilter compressor, each driven by a Corliss engine. Each compressor had an individual oil separator but there was only one set of condenser coils, etc., so that only one machine could be operated at a time. The brewery was refrigerated by brine circulation. The cylinders of the compressors were cooled by the "freezing back" method (utilizing the refrigerating effect in the returning ammonia).

There were two explosions within a few days of each other. The cylinder head of the Linde machine blew out at 7:25 a. m., April 11, 1915, and the cylinder head of the Vilter machine blew out at 5:30 a. m., April 21, 1915, a few hours after it had been started, both compressors having been out of operation during the intervening time between the two explosions.

The two compressors apparently failed due to mechanical weakness in the materials of which the piston rod and follower were made.

The failure of the Linde machine was due to the breaking of the piston rod at the base of the thread at the nut which holds the piston on the rod. The fracture was without signs of flaw or crystallization. The dislodged nut was caught between the piston and the cylinder head on the return stroke and knocked out the head. Probably the vapor, consisting of ammonia and perhaps lubricating oil, filled the room and was ignited from open gas lights, and an explosion resulted, causing considerable damage to the building and machinery.

Repairs were completed in about nine days, and the system tested out to 300 pounds air pressure. After the test was completed, the air was thoroughly pumped out of the system, leaving a vacuum of about 25 inches of mercury. The ammonia was then replaced and the system put into operation, using the Vilter compressor. About fifteen hours later a break oc-

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curred in this compressor; in this case, however, it was not the piston rod which broke, but the follower plate of the piston. The cylinder head was knocked out and the escaping ammonia and oil were again ignited from the open gas lights which had not been removed after the first explosion. The second explosion deranged the entire refrigerating plant and was followed by fire which resulted in the destruction of practically all combustible parts of this building.

Both explosions were probably due to lubricating oil mixed with the ammonia gas when discharged into the refrigerating room. A number of theories have been advanced to account for the rupture of the reciprocating parts of the compressors. The usual stresses, together with the cooling and heating which occurs in every stroke of the piston, may have gradually weakened the piston. At a previous overhauling, the nut on the end of the piston may have been screwed up unduly tight; the expansion of the piston due to heating, in addition to the working loads may have stressed the material beyond the elastic limit. The piston rods were lubricated by the usual oil seal, the oil being circulated by a small pump, the only lubrication of the cylinder being by the oil which escaped from this oil packing. It is possible that an excess of oil may have found its way into the crank end of the cylinder from this source and filled up the clearance space with an incompressible liquid which would account for the break.

CHAS. WEISBECKER, GROCERIES AND PROVISIONS, NEW YORK, AUGUST 31, 1914.

The refrigerating plant consisted of two De La Vergne compressors, one of 40-ton and one of 25-ton capacity, supplying refrigeration by direct ammonia expansion system to the ice boxes in basement, first and third floors. The compressors were chain-driven from 70 and 40 h. p. direct current electric motors. In these compressors oil is injected into cylinders for the purpose of lubrication and cooling. Shortly after midnight, when the engineer was putting new oil into the system, the oil reservoir with glass sight openings connected to the piping broke and ammonia gas escaped into the room to such an extent as to drive out the engineer. The arrangement was such that practically all the oil in the system would be blown out. There was no evidence of any fire or explosion accompanying the bursting of the glass reservoir. There was no exposed fire or light other than the possibility of a spark at the commutators of the electric motors. No explosion appears to have resulted immediately from the liberation of the ammonia vapor, but there was evidence of fire having occurred later. The place was untenable on account of the ammonia fumes for some time. When entered the appearance of the compressor room indicated that a mild explosion or burning of the mixture of the ammonia gas and liberated oil had taken place at some time subsequent to the bursting of the gauge glass. The only spark to account for this ignition would be that from the commutators of the motors. The paint on the walls of the room and on the motors was blistered and discolored, and in some places slightly charred. The layer of cotton over the pipe covering near one of the motors was also burned. Some glass in the partition enclosing the compressor room was broken and papers on the engineer's desk next to the broken sash were found on fire. The insulation on some of the electric light wiring was burned, but the windings of the motors were uninjured. No damage was done outside of the compressor room, other than the burning of the papers on the engineer's desk.

JACOB RUPPERT BREWERY, NEW YORK, JUNE 28, 1912.

The explosion in the refrigerating plant was caused by the breakage of four bypass valves of the water jacketed York cylinders on a 280-ton De La Vergne refrigerating machine operating under 100 to 125 pounds head of steam and delivering ammonia to receiver at about 180 pounds. Oil was used only for lubrication.

It is stated that the machine was

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working normally at time of accident, in which case the bypass valves of cylinders would be closed. (These bypasses are used to draw ammonia vapor from the discharge pipe into the suction pipe when emptying the compressor.)

The cause of the breakage is not easily accounted for, but may have been due to a large influx of liquid ammonia from suction side into compressor; though this irregularity is generally recognized in refrigerating plants, especially in large installations supplying a number of lines, and can usually be adjusted without accident.

Three to five minutes elapsed between the breakage of these valves and the explosion, the latter being due to the ignition of vaporized oil in the escaping ammonia gas, or by the decomposition of the ammonia gas liberating hydrogen which would form an explosive mixture with air.

It is possible that the unenclosed arc lights in the vicinity caused the decomposition of the ammonia, in any event, it would appear that the arcs ignited an explosive mixture however formed.

Part of the electrical apparatus on the switchboard was somewhat damaged and badly discolored. Some material in different parts of the room in the line of the explosion was burned, notably burlap behind the switchboard and a coat hanging 7 feet distant. The damage to machinery was comparatively slight. There was practically no damage to the structure except that some glass and other fragile material in this building and elsewhere in the vicinity were shattered by the explosion.

SCHWARTZCHILD & SULZBERGER COMPANY, NEW YORK, MARCH, 1901.

This explosion occurred in an oil separator in the discharge line from a 200-ton Vilter ice machine. This separator was constructed of extra heavy pipe, with cast steel caps at the ends, with screw joints, soldered at the ends. It was about 12 inches in diameter and 6 feet tall and was supported on a cast iron stand. A draw-off valve at the bottom removed the oil.

Previous to the explosion the compressor had been overhauled. When this was completed the engineer was instructed to clean the oil out of the separator. He claimed he did this, but the oil on the walls after the explosion seemed to indicate that this was not done, although this oil might have been blown out of the rest of the system. They then started to test the system with air pressure. The pressure had been built up to 250 pounds when the separator exploded with great violence seriously injuring a number of employes.

There seems little doubt that the separator or the system contained a considerable amount of oil and that this oil in contact with air formed a combustible or explosive mixture, which was ignited by the overheated air discharged from the compressor. This danger is always imminent when air is compressed in such systems if any oil is present.

ELECTRICAL PROSPERITY WEEK.

Backed by the wealth of the electrical industry and the enthusiasm of thousands of workers, the executive committee of the Society for Electrical Development, Inc., determined on March 24 the preliminary plan of the campaign for "Electrical Prosperity Week" in the first week of December this year.

Central stations, manufacturers, jobbers, contractors, dealers and the technical press are represented in the executive committee.

The adherents of a campaign in the fall of the year declared that the fall was the most advantageous time for such an affair as proposed and that to postpone the affair until next spring would cause a loss of interest.

Special films are to be made for the motion picture theaters to exhibit. A suggestion was that a film, to show the history of electricity, be produced on a big scale. Poster stamps, electric signs, billboards and car cards are to be used extensively in the publicity campaign.

Electrical Prosperity Week promises to be a big success.

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Photo by International News Service.

This photograph was made at the instant a terrific explosion tore off the roof of an oil warehouse in Pearl street, New York, June 12. The explosion was caused by a fire in one of the upper stories of the building.

FIRE CAUSED BY EXPLOSION.

The illustration above shows a fire which occurred in the oil warehouse of Johnson & Oswall in Pearl street, near the Brooklyn Bridge, New York City, as the result of an explosion. Battalion Chief Dougherty found barrels of paint, oil and varnish bursting open from the heat, upon his arrival. The fire extended over the four upper floors. A series of explosions gave impetus to the flames and held the firemen at bay. A third alarm, however, brought sufficient combative force in the form of high pressure streams to confine the flames to the building where they originated, notwithstanding parts of the roof were blown off and windows were forced out. Firemen had many narrow escapes, but no serious casualties occurred. The damage did not exceed $30,000. Johnson & Oswall could not explain the cause of the fire.

FILM EXCHANGES.

Where motion picture film exchanges are among the tenants of an office building, as in the Masonic Temple building, New York, the automatic sprinklers with which the building is equipped, more than anything else, are responsible for a tolerance by the underwriters of the presence of the film. Each individual reel of film is regarded by insurance companies as a unit of hazard regardless of the quantity handled or the safeguards introduced. It is the opinion of underwriters that unless each film is kept in a metal box provided with a tight-fitting cover, and handled according to Fire Commissioner Adamson's recent order, automatic sprinklers may be expected to furnish only a moderate protection, depending upon conditions entirely apart from the sprinklers.

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COMMON FIRE DANGERS.

Illustrating the work of fire prevention associations in various States are the examples of dangerous conditions found, and the underwriters' recommendations for remedying them, given below. The examples are taken from a survey of a small city, but they are typical of danger points in cities, small and large, the country over. It is the custom of fire prevention associations to send copies of their findings and suggestions to mayors, local newspapers, members of city councils and local insurance agents. In each case, street numbers, names of owners and occupancies are given. The assistance and co-operation of citizens and city authorities are asked in order that the fire waste may be reduced.

LUMBER COMPANY'S OFFICE.—Tile flue should be replaced with brick chimney from ground.

MILL OFFICE.—Tin or zinc should be replaced under stove, and wood railing protected from stove with sheet of asbestos.

CARRIAGE SHOP.—Defective wiring should be corrected.

CHURCH.—Remove ashes and rubbish from ground furnace.

STORE AND OFFICE BUILDING.—Remove trash and rubbish from rear of building and over toilet room on second floor. Protect skylight gratings.

Y. M. C. A. BUILDING.—Remove electric wiring from hooks.

GROCERY.—Remove wooden cuspidors.

TAILOR SHOP.—Provide safety for gasoline.

HARDWARE WAREHOUSE.—Place drip pans under lubricating oil. Clean floors. Defective wiring should be corrected.

LIBRARY.—Overhaul electric wiring. Remove open cans of paint. Better care as to cleanliness of rear room.

BARBER SHOP, PRESSING, SHOE REPAIRING.—Provide vent for air light gasoline lighting machine. Protect sidewalk gratings.

GARAGE.—Overhaul entire electric wiring, which is in a very dangerous condition. Practically wired with lamp cord, open joints, not soldered, wires overfused.

PLUMBER'S SHOP.—Overhaul electric wiring. Place zinc under stove.

GENERAL MERCHANDISE STORE.—Defective wiring should be corrected. Remove dynamite from basement. Remove rubbish and packing boxes from basement.

BANK.—Overhaul electric wiring. No subbases on snap switches, wires of cord, loose molding, wires not properly or separated, wires in contact with wood, joints not soldered or taped, overfused.

CHURCH.—Metal protection should be placed over furnace. Protect ceiling with sheet metal, leaving air space between siding and metal in Sunday School room. Defective wiring should be corrected. Circuits overfused. No subbases under snap switches. Broken bracket at stairway to basement.

COUNTY JAIL.—Electric wiring needs attention.

ICE PLANT.—Make large opening between boiler stack and wood.

MOTION PICTURE THEATER, GROCERY, TELEPHONE EXCHANGE.—Provide standard booth. Overhaul electric wiring. Provide safety can for gasoline. Fire marshal is working on this case.

DRYGOODS STORE, HARDWARE STORE ADJOINING.—Overhaul electric wiring. Wires need protection near floor on second story, and subbase required under snap switch in stairway to basement. Wires in contact with gasoline pipe near front door. Joint in basement should be soldered and taped in hardware store.

BAKERY AND RESTAURANT.—Overhaul electric wiring. Place metal under candy kettle.

FURNITURE STORE.—Provide safety cans for gasoline. Inspect electric wiring.

BANK.—Remove paper and rubbish in basement. Ashes should be dumped outside of building. Cold air duct leading to furnace should be covered with metal.

DRUG STORE.—Provide safety can for gasoline. Protect sidewalk gratings.

BUTCHER SHOP.—Place concrete under lard kettle in butcher shop.

JEWELRY STORE.—Clean up and keep more tidy the yard in rear of building.

SAFE LIGHTING.

The preliminary program of the ninth annual convention of the Illuminating Engineering Society which is to be held at the New Willard Hotel, Washington, September 20-23 inclusive, enumerates 36 papers on the subject of artificial lighting, and several of them are to deal with safety methods, presumably. The papers are to be distributed over ten sessions. One of the sessions will be devoted especially to the subject of street lighting. Commercial, general and laboratory papers will each be given three sessions.

Information regarding the convention may be had upon application to the general office of the society, 29 West Thirty-ninth street, New York.

What is wanted in the campaign of education is a knowledge of methods and appliances for preventing accidents more than essays that are intended to arouse employers to a proper sense of their duty. Employers of labor generally are practical sort of "cusses," and we all know that, if shown how, they will do the right thing.—*Walter Greenwood.*

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THE DANGERS OF GASOLINE AND BENZINE

By C. Albert Gasser.

IT is safer to handle dynamite than it is to keep gasoline or benzine in a dwelling house or factory. This broad statement is proven by the records. Dynamite will not explode of itself nor will any accident result except by a very rare combination of circumstances. Benzine, however, is tricky, and fire and explosion will occur under ordinary household conditions. Benzine and gasoline are alike, as far as danger is concerned; what may be said and written about one is equally applicable to the other.

To the expert there is little, if any danger in handling large quantities of benzine. But this is simply because he knows all about the stuff. He wouldn't think of striking a match to light a cigarette or a cigar anywhere near benzine. He would know enough to use electric current for lighting purposes instead of illuminating gas. He would know enough not to have a boiler or stove nearby. He wouldn't do any of the hundred and one things which he knows would result in accident, and so he says there is no danger in benzine or gasoline.

But he cannot deny that thousands of men and women who use benzine haven't the slightest idea of how serious an explosion or fire may result from the most ordinary combination of circumstances. For instance, let us imagine that a woman wants to clean a pair of gloves with gasoline. She sends to a nearby store for a pint or a quart of the stuff and it is brought to her in a bottle. Now, any one of the following things may happen. She may pour the gasoline into an open dish and place her gloves therein. The gasoline throws off a highly explosive vapor. In plain English, it evaporates very quickly and the vapor is dangerous. If there is a gas jet burning, a gas stove doing business in the same room or in an adjoining room, if anybody strikes a match, if you happen to step on a match, or if any spark is created while this vapor is in the air there will be an explosion. The vapor mixes with the air in a room and produces the combination of gasoline and air which drives an automobile. Such power is obtained by a series of explosions, the gasoline being sprayed through a needle-fine opening into the carbureter. In just this manner the room in which such gasoline is exposed becomes a huge carbureter, and if the house was on wheels and the other engine arrangements were in place the house would become a great big automobile.

But it is not even necessary to have a spark of match or gas jet to cause trouble. If your gloves happen to be silk gloves and you put them on your hands and rub them during the cleaning process, friction is produced which has the same effect as a match and an explosion follows instantly.

And then, after the gloves have been cleaned the dirty benzine is generally poured into the kitchen sink. In the sewer, men at work cleaning pipes, are thereupon subjected to the danger of explosion because they carry lanterns and, besides, they frequently smoke in the big sewers, and when they smoke they use matches. But aside from the danger to sewer employes, there is always danger, until the kitchen is thoroughly ventilated of the gasoline vapor being present and an hour or two later some one may light the gas or the gas stove and an explosion may occur.

The vapor of benzine and gasoline is not visible ordinarily, and herein lies the danger. If it were a cloud of dust you could see it and get out of the way; but it is a part of the very atmosphere and you can not see it. Depend upon it, however, the vapor is all about you, a danger which threatens death, although an invisible agent. And this vapor is heavier than air and generally hangs down near the floor level or within a foot or two of the floor level. It is like a train of powder, and if it takes fire at any point the fire will travel along until it reaches the

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dish in which the gasoline is exposed and set fire to it. Such an invisible train of gasoline vapor often extends fifty or sixty feet and there is record of a train of vapor which took fire in a leather shop eighty feet away from the point where the naphtha was stored. Naphtha acts just as benzine or gasoline acts under most conditions.

In lodging houses, in rooming houses and in some tenements, to go no farther, benzine is used for exterminating purposes. This is just like spraying a train of vapor everywhere and any spark is apt to result in explosion and fire.

It is apparent, therefore, that the greatest danger lies in the evaporation of benzine. To avoid that evaporation is impossible.

It is far better not to have any benzine or gasoline in the home. It is far better to have your gloves cleaned somewhere else than in your own home.

It does not pay to save ten cents in the cleaning of a pair of gloves if it may cost a person's life.

And the records show that hundreds of women—and most of them, young women, have been burned to death by the use of gasoline or benzine in homes.

Safety cans, approved by the Underwriters' Laboratories, meet the requirements for using and storing gasoline and benzine, and should always be used. Such cans can be easily procured from a dealer.

FIRE FIGHTING TROLLEY CAR.

Park Point, a suburb of Duluth, Minn., was confronted with a problem in fire fighting, offering several difficulties. The fire department of the city of Duluth set about to solve it in a novel manner by equipping a street car as indicated in the picture as a complete fire fighting machine. The equipment consists of 1,500 feet of 2½-inch hose, 2 shut-off nozzles, 20, 26 and 30 foot ladders, a 14-foot roof ladder, 6 axes, 4 pike-poles, 2 six-gallon Babcock extinguishers, rubber coats and hats for volunteers.

Park Point is solely a residential section and forms one street only from which all parts of the suburb can be reached by hose connections. The car

used was purchased at a cost of $650, and an arrangement has been consummated with the trolley company whereby they charge the city $30 a month for the use of the tracks, which charge includes also the housing of the car when not in use. This is the first time that the street railways have been put to this use. Other localities might advantageously follow Duluth's lead in this form of fire protection for detached suburbs where poor roads or other barriers prevent ready response by motor or horse equipment.

SUGGESTION BOXES.

The safety committee of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., is getting good results from safety suggestion boxes. It reminds every workman: "The suggestion boxes give YOU the opportunity to report all dangerous places and to make your suggestions for better conditions in the mills. A handsome watch fob is given for good suggestions. One dollar in cash will be given each month for the best practical suggestion from each mill. This is your opportunity to boost 'Safety First' and GET THAT DOLLAR!"

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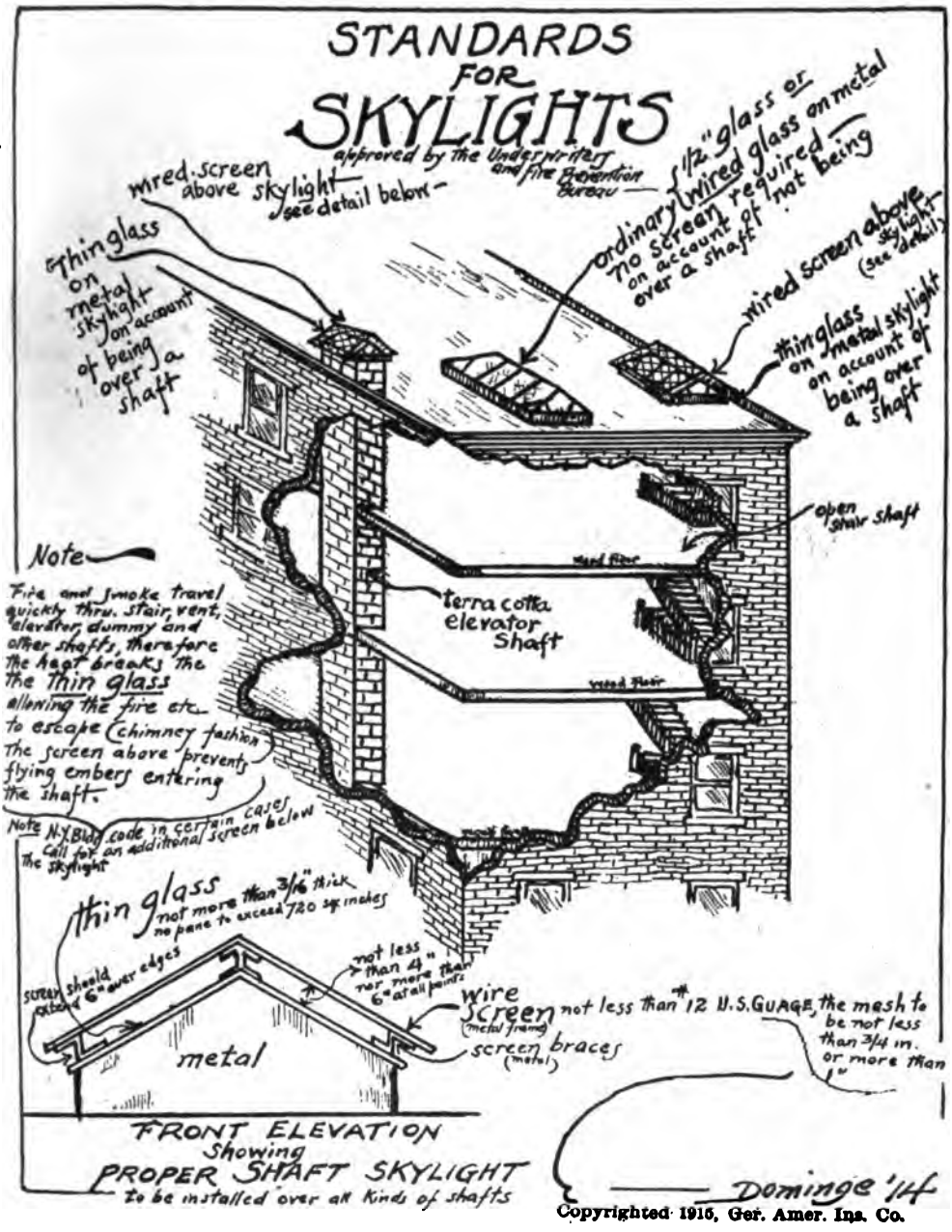
LESSON-PICTURES IN FIRE-SAFETY


STANDARDS
FOR
SKYLIGHTS
approved by the Underwriters and Fire Prevention Bureau
wired screen above skylight see detail below
thin glass on metal skylight on account of being over a shaft
ordinary 1/2" glass or wired glass on metal no screen required on account of not being over a shaft
wired screen above skylight (see detail)
thin glass on metal skylight on account of being over a shaft
open stair shaft
Note
Fire and smoke travel quickly thru. stair, vent, elevator, dummy and other shafts, therefore the heat breaks the thin glass allowing the fire etc. to escape (chimney fashion) The screen above prevents flying embers entering the shaft.
terra cotta elevator shaft
Note N.Y. Bldg. code in certain cases call for an additional screen below the skylight
thin glass not more than 3/16" thick no pane to exceed 720 sq. inches
screen should extend 6" over edges
not less than 4" nor more than 6" at all points
wire screen (metal frame)
not less than #12 U.S. GUAGE, the mesh to be not less than 3/4 in. or more than 1"
screen braces (metal)
metal
FRONT ELEVATION
Showing
PROPER SHAFT SKYLIGHT
To be installed over all kinds of shafts
Dominge '14

Copyrighted 1915, Ger. Amer. Ins. Co.

NOTE.—Graphic and instructive interpretations by an artist on the staff of the German American Insurance Company of New York of the standards of Fire Underwriters, showing how fire dangers may be diminished or prevented, were mentioned in the July number of SAFETY ENGINEERING and examples were given. The drawings are by Mr. C. C. Dominge of the insurance company's schedule department. Four more object lessons are presented in this number. They relate to the construction of skylights, the construction of piers, pillars, etc. (if of stone or partly of stone), the standards for cluster gas lights and the standards for low gas stoves.

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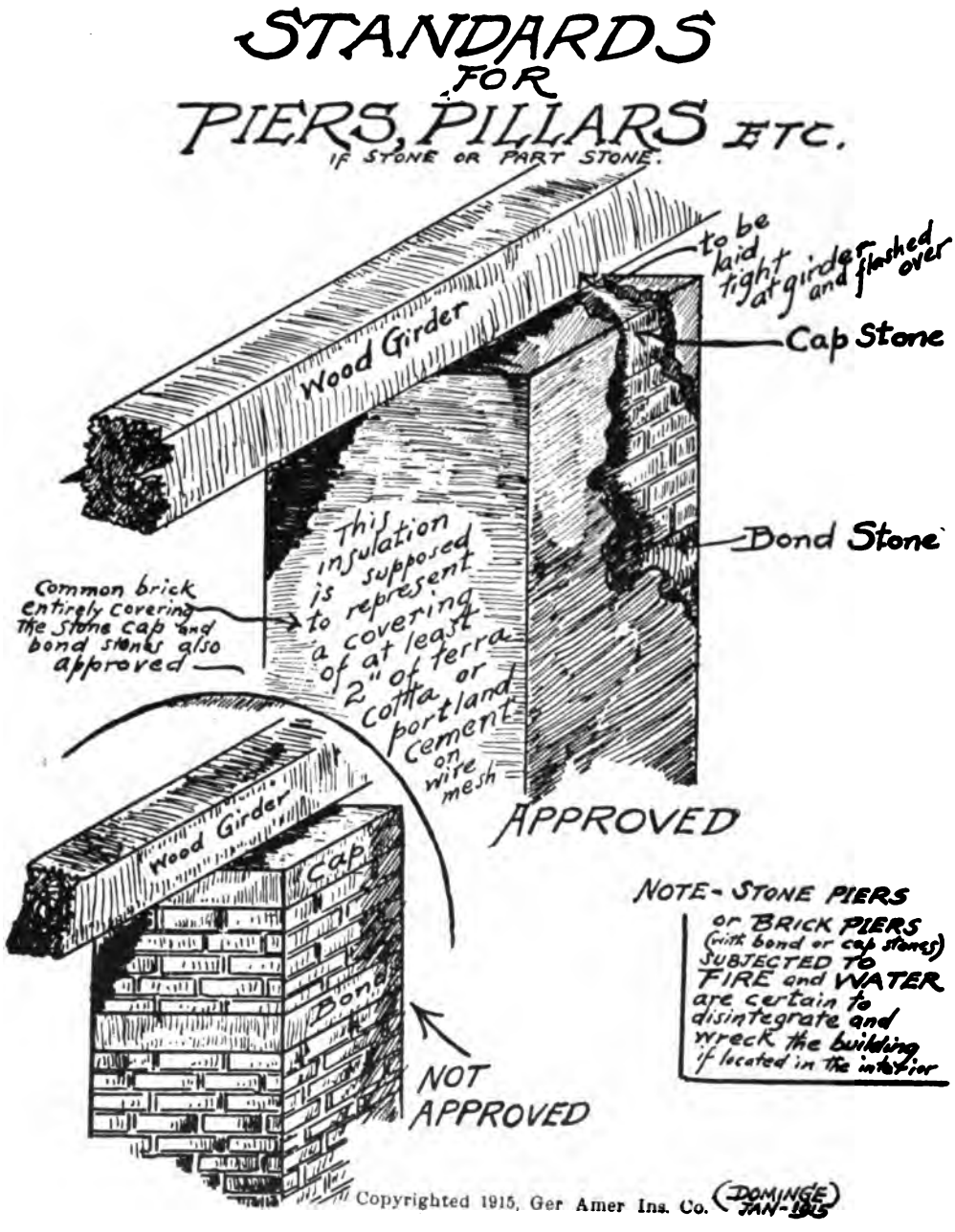
STANDARDS
FOR
PIERS, PILLARS ETC.
IF STONE OR PART STONE.
to be laid tight at girder and flashed over
Wood Girder
Cap Stone
Bond Stone
This insulation is supposed to represent a covering of at least 2" of terra cotta or portland cement on wire mesh
Common brick entirely covering the Stone cap and bond stones also approved
APPROVED
Wood Girder
Cap
Bond
NOT APPROVED
NOTE - STONE PIERS or BRICK PIERS (with bond or cap stones) SUBJECTED TO FIRE and WATER are certain to disintegrate and wreck the building if located in the interior
Copyrighted 1915, Ger Amer Ins. Co. (DOMINGE JAN-1915)

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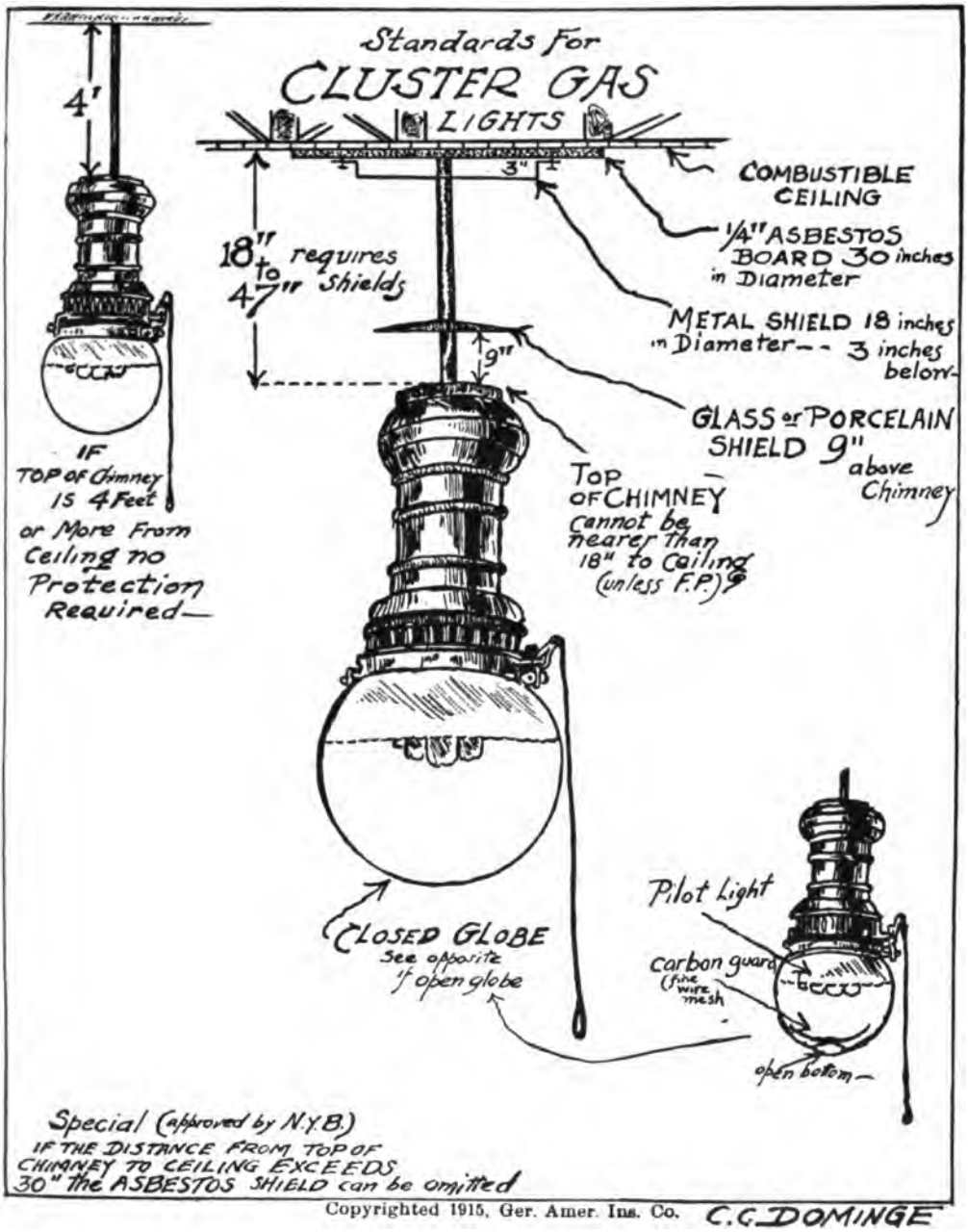
Standards for
CLUSTER GAS
LIGHTS
4'
3"
COMBUSTIBLE CEILING
1/4" ASBESTOS BOARD 30 inches in Diameter
18" to 47" requires Shields
METAL SHIELD 18 inches in Diameter -- 3 inches below
9"
GLASS or PORCELAIN SHIELD 9" above Chimney
IF TOP of Chimney IS 4 Feet or More From Ceiling no Protection Required
TOP OF CHIMNEY cannot be nearer than 18" to Ceiling (unless F.P.)
CLOSED GLOBE See opposite if open globe
Pilot Light
carbon guard (fine wire mesh
open bottom
Special (approved by N.Y.B.)
IF THE DISTANCE FROM TOP OF CHIMNEY TO CEILING EXCEEDS 30" the ASBESTOS SHIELD can be omitted

Copyrighted 1915, Ger. Amer. Ins. Co. C. C. DOMINGE

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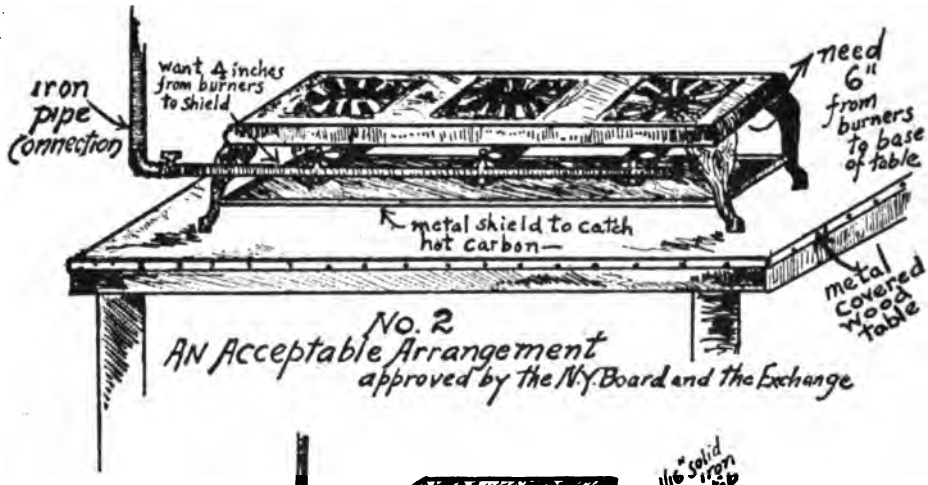
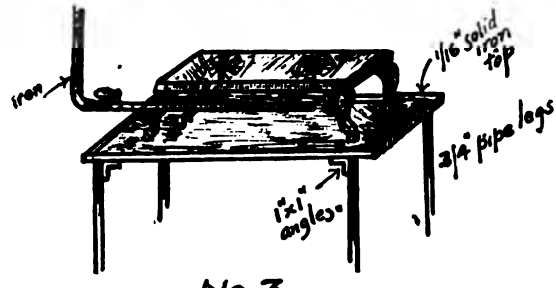
STANDARDS FOR LOW GAS STOVES

NO. 1
AN UNSAFE ARRANGEMENT
NOTE— THE RUBBER TUBE and the wood bench


iron pipe connection
want 4 inches from burners to shield
need 6" from burners to base of table
metal shield to catch hot carbon—
metal covered wood table

No. 2
AN Acceptable Arrangement
approved by the N.Y. Board and the Exchange



No. 3
An Ideal Arrangement (all iron construction)

Copyrighted 1915, Ger. Amer. Ins. Co.

C.C. Domingo-1913

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EDITORIAL

Violations of Safety Principles.

IN spite of the fact that most hazards are pre-determinable, the history of this country shows that it takes spectacular accidents and calamities to sufficiently impress the public to demand action to eliminate certain hazards and thereby prevent a repetition of similar occurrences. It is to be hoped that the Eastland disaster will have an effect on present and future shipbuilding operations and inspections similar to that of the Iroquois fire on theater construction.

The facts so far established, in the Eastland case, reveal an entire disregard of the fundamental, underlying principle of safety—that is, "where any man's operations are essential to the safety of himself and others, he should not only know it but be automatically and constantly reminded of that fact."

The design of the Eastland made it necessary that the water ballast tanks should be filled when the boat was loaded, in order to retain stability. Not admitting for a moment that such a condition, in itself, is desirable or tolerable, yet, had the fact been known and the necessary measures taken to positively demand that this precaution be taken, the accident would not have happened.

It appears that only the designers and the builders were acquainted with this essential for the stability of the boat. Nothing so far developed shows that the government inspectors had any idea that the ballast tanks had a vital relation to the safety of the boat. If the inspectors knew, and failed to insist that the requisite for safety be complied with, nothing less than criminal neglect can be charged against them.

Undoubtedly water ballast can be and is being used to advantage in "trimming," but when it is depended upon for stability in carrying a normal load, under normal and favorable conditions, it is in direct opposition to the principle of safety which demands "that a boat or any other device be designed and constructed to prevent removal or misuse of essential parts." Clearly the design of the Eastland complied in no detail with that principle.

Pertinent to the same principle, attention should be called to the inadequate exit facilities employed by excursion boats when docked. Apparently the Eastland officers gave no order to use exits, but, had they done so, it is ventured as a fair opinion that the order would have had little effect on the magnitude of the tragedy because the exit facilities of the boat and the dock were inadequate. In this respect, it must be charged that the City of Chicago was at fault. It would seem that the city which had the experience with the Iroquois fire would be the last of cities to disregard exit facilities, in any place where crowds assemble. As a matter of fact, a casual inspection of docks and methods for unloading excursion boats indicates that exit capacities are so inadequate that as much as 30 minutes may be required to unload some of the boats after the gang-

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way is opened. Let it be assumed that the Eastland had caught fire instead of overturning. The indications would be that the list of casualties would have been equally large, if not greater. That phase of neglect cannot be charged to the Federal inspection department. Docks are governed by local authorities and they should be subject to regulation, as respects the safety of the public, as much as theaters are. The exit problem for boats is simpler than for buildings in view of the opportunity for horizontal exits. The evidence indicates, however, a lamentable neglect, in the Eastland case, possibly due to ignorance.

One fact stands out prominently, as a result of the calamity. The Federal government must have the "authority, men and money" to supervise, not in a perfunctory manner but fundamentally, the construction and the operation of all steamboats and steamships that are built to carry passengers. Definite rules and regulations must be formulated for determining the actual quota of passengers a ship can carry with safety. The inspector's opinion should not enter into the case at all. If the government has no men, at the present time, capable of formulating such rules, a board of naval architects should be formed to compile standards. Public safety demands this protection and the taxpayers, in their own interest, are willing to pay the bill.

Automatic Sprinklers and the Public

NO METHOD for reducing the danger to life and property from fire, by a prompt extinguishment of fire outbreaks, has been more successful than the automatic sprinkler method. Where sprinkler equipments exist it is unnecessary, except in rare cases, to summon the public firemen. Of course, the prime essential for fire prevention is fire-resistive construction everywhere; but the time when all buildings shall be fire-resistive is somewhere in the far future. Many fires are put out by simple means—chemical extinguishers, pails of water, etc., but when these fail, as they do if the persons who use them are over-excited, the flames develop quickly into large proportions. As everybody knows, the automatic sprinkler is always on the job. It is a sentinel to detect fires and a power to put them out. At the critical moment, and at the right spot, it concentrates the quantity of water required to extinguish the blaze. Usually the fire is overcome with trifling loss. SAFETY ENGINEERING has always placed a very high valuation on automatic sprinkler service. For years it has advocated a more general installation of sprinklers in order that life and property may have the best possible protection.

Automatic sprinklers are so good and so useful, in the opinion of this magazine, that nothing should be allowed to stand in the way of the widest practicable extension of that form of protection against all the dangers from fire. Certainly every community would be safer; every man, women and child domiciled in crowded tenement houses would be safer; every inmate of a hospital, an asylum or of other public institutions would be safer; every employe of a mill, factory or mercantile establishment would be safer, and less exposed to a loss of wages by an interruption of business due to a fire, if automatic sprinklers were in use generally. And tragedies such as the Triangle Waist Company

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fire, the High street fire in Newark, the Binghamton clothing factory fire, and other disasters, would not have occurred if sprinklers had been on guard. Hundreds of thousands of sprinkler heads should be ready to do their work in dangerous places where no protection of that kind exists today.

SAFETY ENGINEERING expresses the opinion that the time has come when the manufacturers of automatic sprinklers should ask themselves some questions, which we will merely suggest. A wise management in any line of business (particularly a business which, to a considerable extent, is a custodian of human life) is a management that looks ahead, that manifests a purpose to deal liberally with the people in the matter of prices, that adopts a policy of co-operation with the public and is satisfied with moderate and sufficient profits; in short, a management that places the public interest—in this case the saving of lives and property—above a degree of monetary gain, which may mean excessive dividends to stockholders. That these considerations have not always appealed to the sprinkler companies, we should be sorry to believe. If automatic sprinkler protection is not now obtainable by the people from any and all of the sprinkler companies, on fair and reasonable terms, taking into consideration known costs of manufacture and of installation, and under a condition of free and open competition among all companies, the sellers of these protective devices, that the public needs and will continue to need in increasing measure, should give early attention to remedying the situation as a duty to the public and to themselves.

The owner of a building, or a merchant or a manufacturer, who is ordered by a fire commissioner to put in a sprinkler system in order to protect lives, should be required to pay a fair price for a good and reliable sprinkler system, based on what he gets in material and work. If he is required to pay for maintaining manufacturers' associations of sprinkler manufacturers, or a share of other heavy expenses that form no natural part of the cost of the manufacture and installation of a sprinkler system, he may reasonably object to paying such tribute. And if he must do so in order to obtain his sprinkler system and protect his tenants or employes, the hardship imposed upon him must be regretted by the municipality, and must become a public concern, sooner or later.

Public Safety and Explosives.

THE frequent bomb outrages occurring continually in all parts of the country, suggest a serious question as to why more stringent supervision of explosives is not exercised by the Federal and State governments.

Is there any reason why an irresponsible individual should be able to procure dynamite and other high explosives without proper credentials? We have restrictions around the sale of drugs and poisons—largely for the prevention of self-destruction. Are we not entitled to the same protection against assassins? It should not be possible for any man to purchase high explosive without a permit. Manufacturers of explosives, contractors, mining corporations and other industries needing such explosives in their work should be compelled to keep them under conditions and safeguards that will make it impossible for any unauthorized party to obtain them. Questions of this nature are of more value for discussion in legislative halls than the design of decolette gowns to be worn by women in public.

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The Most Needless Waste of Human Life in America

Do You Realize

That more than 5000 people are killed every year in the United States while trespassing on Railroad tracks?

That trespassing causes a greater loss of life on American Railroads than all other causes put together?

That fatalities to trespassers, while classed as "railroad accidents," are accidents for which the public alone is responsible?

That when you trespass on a railroad you are breaking a law made for your own protection?

It Is A Fact

That more people are killed every year trespassing on Railroad tracks in the United States than the total number who lost their lives in the Johnstown flood, the San Francisco earthquake and fire, the Salem, Baltimore, and Jacksonville fires, and the sinking of the Titanic and Lusitania.

You Must Admit

That if 5000 people were killed by some catastrophe tomorrow in the streets of New York or Chicago, the whole nation would respond with help for the widows and orphans. Steps would immediately be taken to prevent the recurrence of such a catastrophe.

Wouldn't *you* think then that *you* and the other people of this country would take some steps to prevent the annual recurrence of this, the only great catastrophe that happens in this country regularly every year?

When *you* see any man, woman or child walking on Railroad tracks, won't you take the time to warn them of the danger they run?

A word from you may save a life.
Don't You Trespass!

Bulletin issued by the Lines comprising the Pennsylvania Railroad System.

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ELEMENTS OF SAFEGUARDING

OVERHEAD TRAVELING CRANES

By F. W. Bail.

THE overhead traveling crane, until recent years chiefly a pet of the large steel mills, has rapidly developed into one of the most indispensable parts of the equipment for practically all plants where stock or finished product of any considerable weight or bulk is to be handled. The safeguarding of cranes is unique among all other mechanical devices because they not only possess dangers for the operator, but they carry a lurking peril over large areas in many shops. These hazards can, however, be almost entirely eliminated if the responsible parties do their part to promote safety. The prospective buyer should demand those features of design and installation which insure against failure of essential parts at critical moments, minimize repairs and secure general safety. The owner of an unguarded crane should equip it with effective guarding devices and the plant superintendent should train employes in safe practices and maintain strict discipline. The recommendations in this article will follow the above divisions and order.

The crane buyer has before him a market in which several high grade manufacturers have entered into the spirit of the Universal Safety Movement by instructing their designers to place safety above all else, while to others safety is an afterthought as evinced by their advertisement "Guards supplied if specified." The latter, although their product may be excellent from the point of service, entirely lose sight of the tremendous industrial losses suffered by the manufacturers of this country who neglect to provide workmen with safe working conditions. They offer the guards-supplied-if-specified clause to ap-

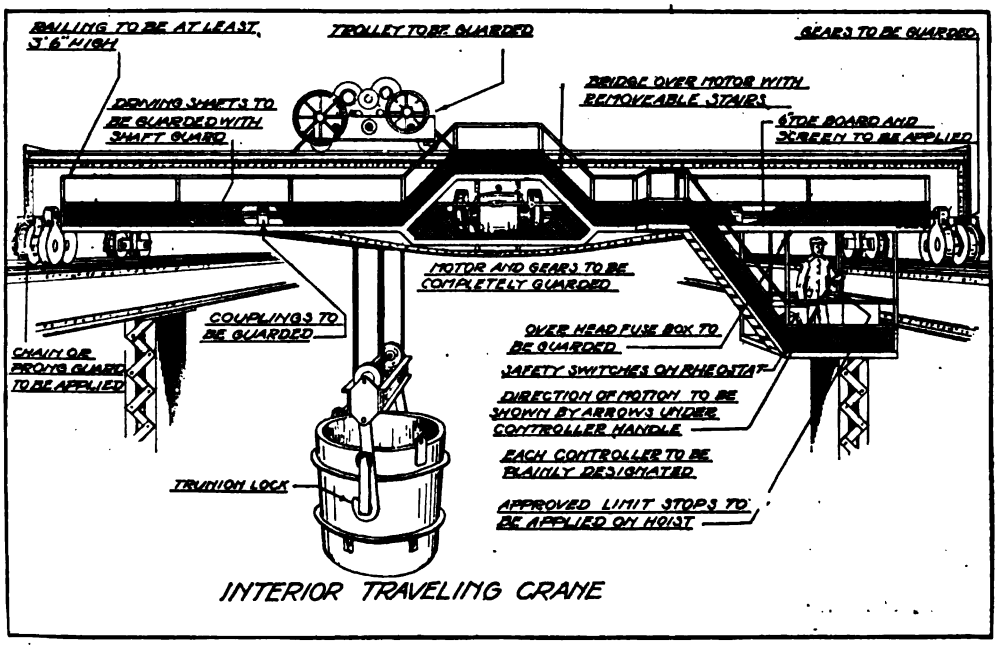
RAILING TO BE AT LEAST 3'6" HIGH
TROLLEY TO BE GUARDED
GEARS TO BE GUARDED
BRIDGE OVER MOTOR WITH REMOVEABLE STAIRS
DRIVING SHAFTS TO BE GUARDED WITH SHAFT GUARD
TOE BOARD AND SCREEN TO BE APPLIED
MOTOR AND GEARS TO BE COMPLETELY GUARDED
COUPLINGS TO BE GUARDED
CHAIN OR PRONG GUARD TO BE APPLIED
OVER HEAD FUSE BOX TO BE GUARDED
SAFETY SWITCHES ON RHEOSTAT
DIRECTION OF MOTION TO BE SHOWN BY ARROWS UNDER CONTROLLER HANDLE
EACH CONTROLLER TO BE PLAINLY DESIGNATED
TRUNION LOCK
APPROVED LIMIT STOPS TO BE APPLIED ON HOIST
INTERIOR TRAVELING CRANE

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Fig. 1.

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pease the buyers who demand safety, but these buyers should realize that aside from the so-called "human element," many of the chief dangers of crane work can be obviated only by applying safety in the elemental features of design and installation and not by a hit or miss sprinkling of flimsy gear guards.

The nature of material to be handled, the speed at which this must be accomplished and the available line voltage are of course the first considerations to the buyer. A careful determination of the proper relationship among these elements obviates most crane trouble at the men do not misuse it, and economy often demands this additional trolley equipment.

The structural work should have physical and chemical properties in accordance with the manufacturers' standard specifications for railway bridge steel and the entire crane should be of all "steel construction," excepting such parts as drums, brackets, etc., where strength is of minor importance. No wood or other combustible materials should be used under any consideration. A wind-load of not less than 30 lbs. per square foot of exposed surface should be

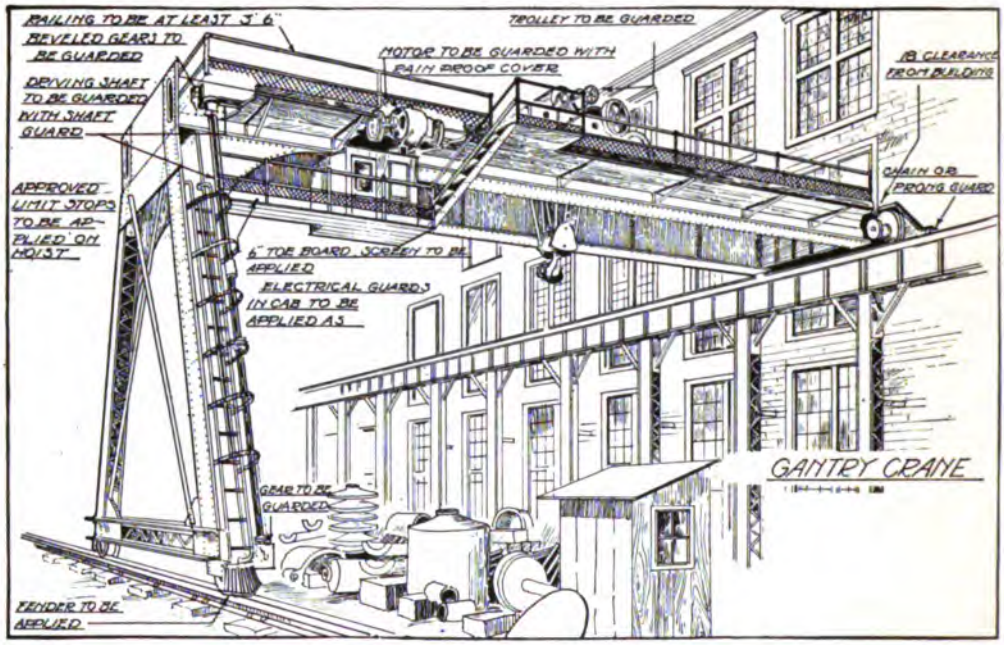
RAILING TO BE AT LEAST 3' 6"
BEVELED GEARS TO BE GUARDED
DRIVING SHAFT TO BE GUARDED WITH SHAFT GUARD
APPROVED LIMIT STOPS TO BE APPLIED ON HOIST
TROLLEY TO BE GUARDED
MOTOR TO BE GUARDED WITH RAIN PROOF COVER
18 CLEARANCE FROM BUILDING
CHAIN OR PRONG GUARD
6" TOE BOARD SCREEN TO BE APPLIED
ELECTRICAL GUARDS IN CAB TO BE APPLIED AS
GEAR TO BE GUARDED
FENDER TO BE APPLIED
GANTRY CRANE

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Fig. 2.

start by obtaining a crane which is adapted to the regular service duty, thereby minimizing repairs, on account of which many accidents have occurred. Where little head room is available for the ordinary type of interior cranes, several feet may sometimes be gained by selecting a crane with the bridge girders butted against the truck beam instead of setting on stop. An auxiliary hoist for handling of light loads by heavy cranes is no additional hazard, providing crane provided for outside cranes. Minimum safety factors, under full static load stresses based on the ultimate strength of the material, should be as follows: 5 on girders, 8 on ropes, and 10 on all other parts. The rope should be of plow steel; a 6 strand 37 wire rope with a hemp core is very flexible and suitable for the average crane. A soft iron core should be substituted for the hemp when exposed to severe heat. The hooks should be forged from soft basic O. H.

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steel equipped with safety handles and well annealed. The blocks should be of an enclosed type and so designed as to prevent any tendency of the rope to twist. The journals and shaftings should be of sufficient size to bring pressure and deflections within practical limits. All driving and driven gears should be mounted on frames or casings formed of one-piece steel castings, as this practice in design tends to prevent stripping, when heavy stresses are set up, due to poor alignment. All bolts should be of the through type equipped with lock nuts and washers. No stud bolts or cap screws should be used. The hoist drums should be at least 30 times the diameter of the rope, for drums of large diameter greatly enhance the life of the ropes. Two full raps in the grooves when the hook is at the lowest position specified, should be provided for. Each hoist should be equipped with two brakes, electrical and mechanical, a load brake of the multiple disc type, and slow speed is considered by several authorities as the most desirable, as it acts with certainty and without shock. The trolley and girder trucks should be equipped with safety lugs which will prevent them from dropping more than an inch in case an axle or wheel should break.

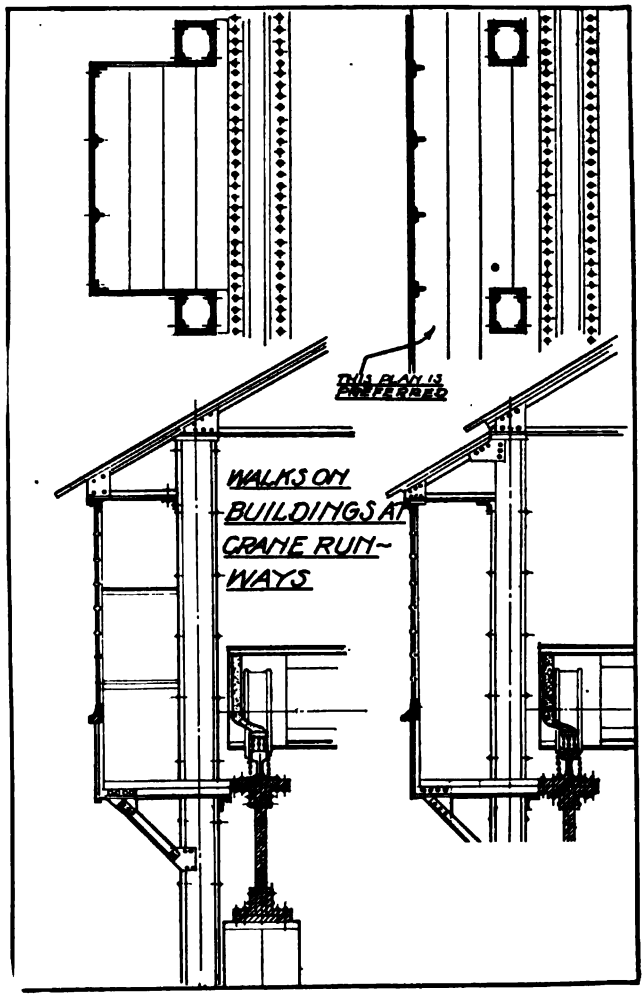

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Fig. 3.

The installation of all electrical equipment should conform to the requirements of national approved standards. All parts carrying current should be insulated or guarded, except trolley conductors. They should be of structural shapes and well supported to prevent falling if a break occurs. The conductors should be so located that accidental contact with the hoist ropes is impossible. All switches and fuse boxes should be of an enclosed type and the main line switch should be designed to receive padlocks.

Suitable walks and stairs with anti-slip surface, equipped with standard hand rails and toe boards should be provided. The walks should extend along both sides and over the ends of the bridge. The operator's cage should be rigidly constructed and be of ample size for the operator and the equipment. Where controllers with external resistance are used, the external resistance units should be placed outside of the cage.

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Typical ladle and gantry cranes are shown in Figs. 1 and 2.

The buyer should specify the above essentials to safety in the design. They have an intrinsic value far greater than any amount of guarding applied to a poorly designed crane. He should also supply himself with a duplicate set of working drawings and calculation sheets.

The installation of the crane should receive equally careful attention. There should be a minimum clearance of 7 feet above all walks, and truck clearance should be at least 18 inches or, where manufacturing or storage on one or both sides of the main shed and the rail base is placed at a suitable height above the level of the gallery floor. Where such is the case, an effective barrier should be placed along the runway to prevent workmen from leaning over or stepping out on the rail.

The owner of unguarded equipment can do much to promote the safety of his employes by slight alterations or the addition of certain safety devices and guards. Cranes lacking essentials such as limit switches, suitable foot walks and stairs should be altered to include

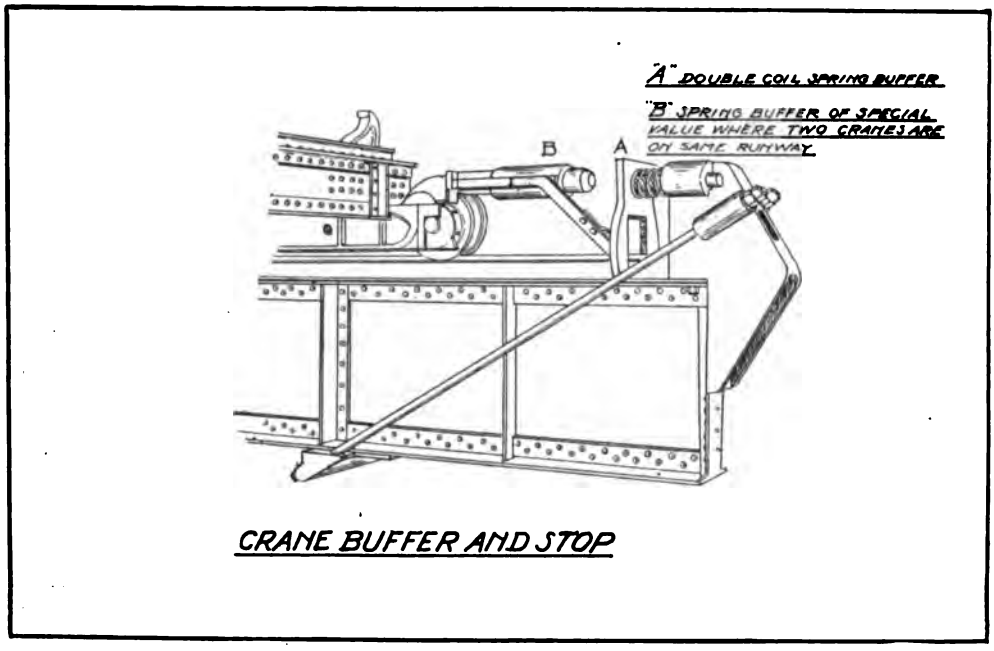

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Fig. 4.

this is impractical, walks parallel to the runway or other adequate means of escape should be provided, as shown in Fig. 3. Numerous serious accidents have happened to repair men and window cleaners where this precaution has been neglected, due to the interest of the operator usually being confined to the load not permitting any attention to travel. An adequate automatic cut-off switch and bumpers should be applied at the ends of the runway. (See Fig. 4.) Numerous plants have galleries for these features. A reliable type of hoist limit switch is shown in Fig. 5, and there are several other good types on the market. Adequate means of access to the crane runway should be provided. Home-made foot walks with anti-slip surface and equipped with standard hand rails can be easily applied to the bridge girders by means of angle iron brackets. The railings should provide a minimum of 18 inches trolley clearance. Where overhead clearance does not permit the walk to be placed

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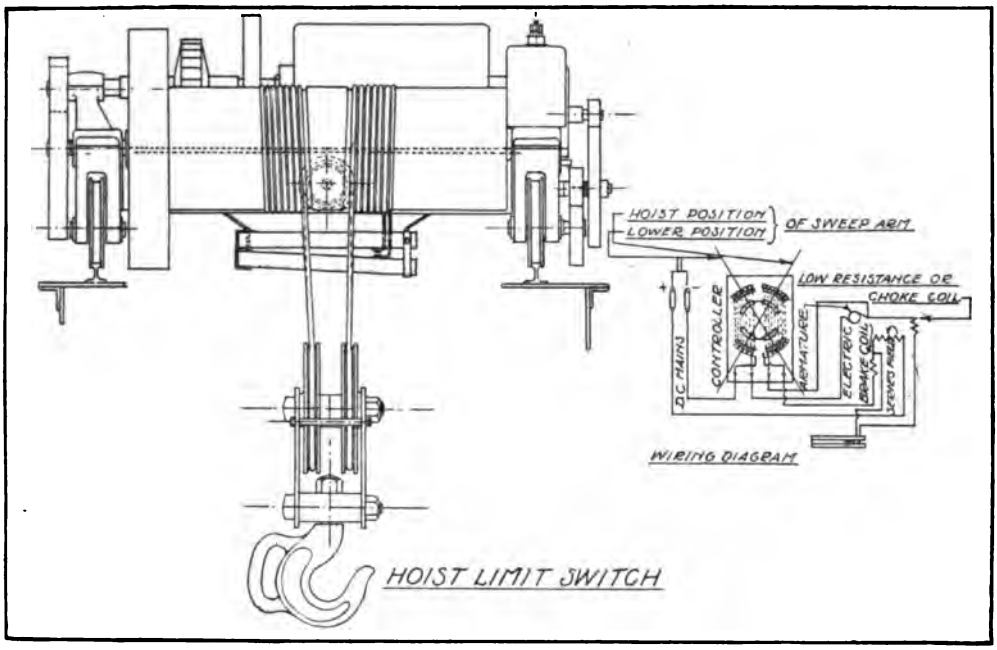

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Fig. 5.

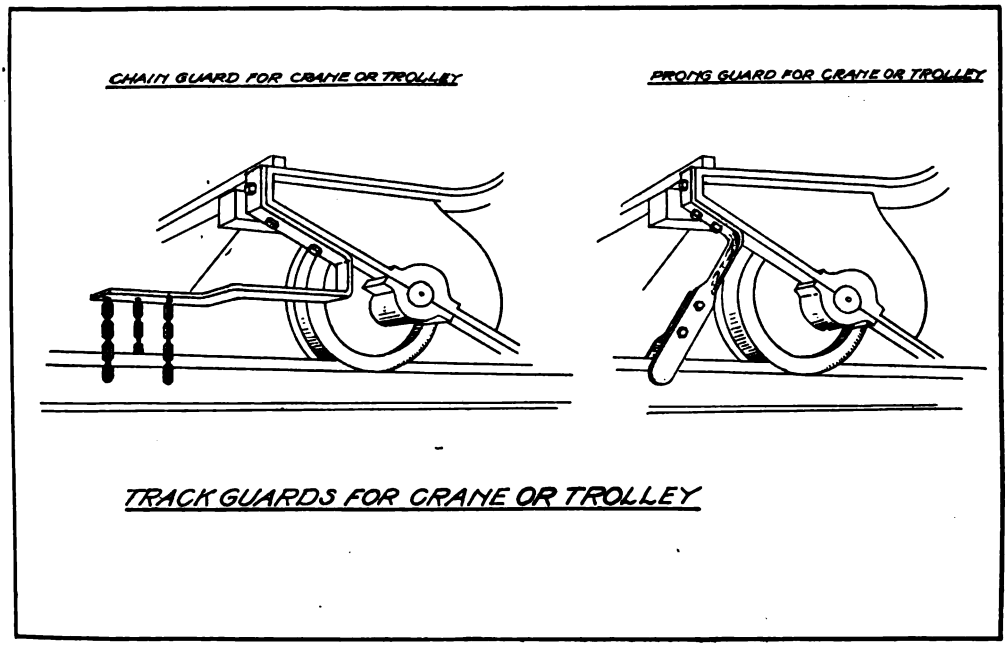

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Fig. 6.

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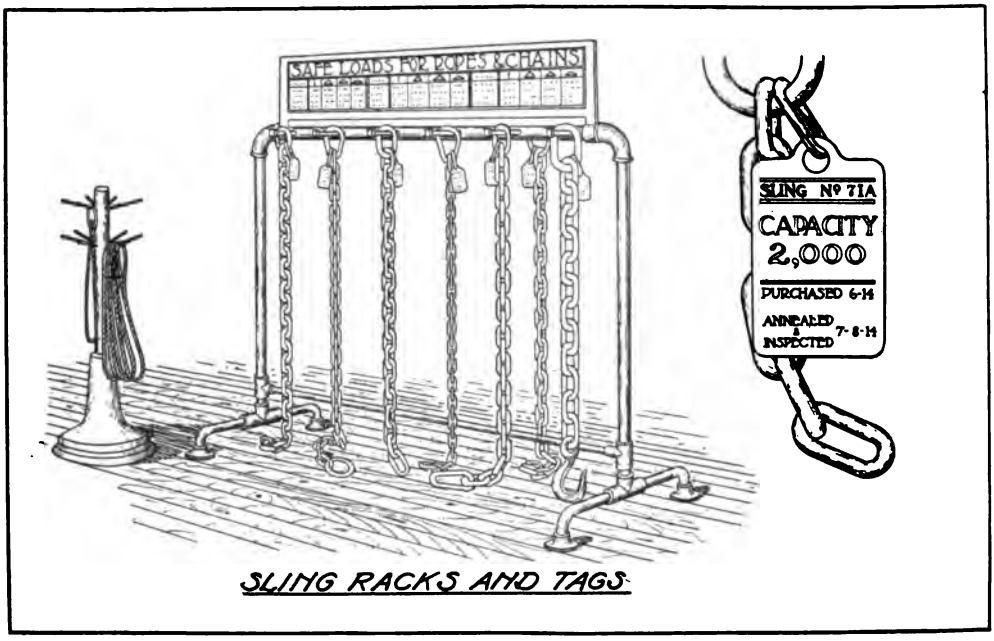
above the motor, it may be extended around it. All couplings and set screws should be of a safety type and all power driven shafting should be guarded. (See June number of SAFETY ENGINEERING.) All power driven gears should be guarded and all overhung gears should be so protected that they cannot fall to the floor. Chain or prong guards should be applied to the truck and trolley wheels, as shown in Fig. 6. Where trolley construction is not of the enclosed type, it should have a catch pan suspended below it. Plates showing rated capacity of each hoist should be prominently displayed on the bridge girders. Ladle crane cages should be equipped with a steel shield suspended at least 6 inches below the floor of the cage and a metal closet lined with asbestos should also be provided, into which the operator can step in case limit switches fail to work and a spill is imminent. Rainproof covers should be provided for all motors on exterior cranes. The cab should be completely enclosed and windows provided on three sides. Where possible, gantry tracks should be elevated 6 or 7 feet, otherwise fenders and automatic grade crossing gongs should be applied. It is a good practice to paint the high points of stationary objects on the floor or in the yard with white paint, as this makes them more conspicuous to the crane operator.

The foregoing suggestions will go far to muzzle the equipment where safety has been neglected in original design of cranes, but all the excellence of design and guarding will be of little value if the superintendent does not educate the operator and the workmen in the safe practices of crane operations and also maintain strict discipline among them.

In numerous shops where floor equipment, such as machine tools, etc., is well guarded, the subject of safety on cranes and their operation is often treated very lightly. The superintendent should impress upon employes the fact that safety in crane operations is a serious problem and must be treated as such. A slogan from one of the most progressive firms in the safety movement is quite applicable here, "Don't kid about safety, you may be the goat!"



SLING RACKS AND TAGS

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Fig. 7.

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SAFE LOADS FOR ROPES AND CHAINS
(IN POUNDS)

CAUTION: When handling molten metal, wire ropes and chains should be 25% stronger than indicated in table

NOTE. The safe loads in table are for each SINGLE rope or chain. When used double or in other multiples the loads may be increased proportionately.

	DIA.	WHEN USED STRAIGHT	WHEN USED AT 60° ANGLE	WHEN USED AT 45° ANGLE	WHEN USED AT 30° ANGLE
PLOW STEEL WIRE ROPE (6 strands of 19 or 37 wires.) If crucible steel rope is used reduce loads one-fifth	¼	1,500	1,275	1,050	750
	⅜	2,400	2,050	1,700	1,200
	½	4,000	3,400	2,800	2,000
	⅝	6,000	5,100	4,200	3,000
	¾	8,000	6,800	5,600	4,000
	1	10,000	8,500	7,000	5,000
	1¼	13,000	11,000	9,000	6,500
	1½	16,000	13,500	11,000	8,000
	1¾	19,000	16,000	13,000	9,500
	1¾	22,000	19,000	16,000	11,000
CRANE CHAIN (Best Grade of Wrought Iron Hand-made Tested Short Link Chain.)	DIA. IRON				
	¼	600	500	425	300
	⅜	1,200	1,025	850	600
	½	2,400	2,050	1,700	1,200
	⅝	4,000	3,400	2,800	2,000
	¾	5,500	4,700	3,900	2,750
	⅞	7,500	6,400	5,200	3,700
	1	9,500	8,000	6,600	4,700
	1¼	12,000	10,200	8,400	6,000
	1½	15,000	12,750	10,500	7,500
	1⅝	22,000	19,000	16,000	11,000
MANILA ROPE (Best Long Fibre Grade)	DIA. / CIR.				
	¼ / 1	120	100	85	60
	⅜ / 1½	250	210	175	125
	½ / 2	360	300	250	180
	⅝ / 2½	520	440	360	260
	¾ / 2¾	670	520	420	300
	1 / 3	750	625	525	375
	1¼ / 3½	1,000	850	700	500
	1½ / 3¾	1,200	1,025	850	600
	1¾ / 4½	1,600	1,350	1,100	800
	1¾ / 5¼	2,100	1,800	1,500	1,050
	2 / 6	2,800	2,400	2,000	1,400
	2½ / 7½	4,000	3,400	2,800	2,000
	3 / 9	6,000	5,100	4,200	3,000

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Fig. 8.

The practice in hooking up the load should closely resemble a military drill. Numerous minor accidents occur by careless holding of slings and hooks before the slack is taken up. Safety hooks only should be used and they should always be held by the handles. Exceeding care should be taken to have the trolley directly over the load before the signal for hoisting is given. Signals should be given only by the foreman of the hooking-up gang. At the proper signal, the operator should take up the slack, lift the load about a foot and then stop, the hookers stepping back in the meantime. This stop not only serves to test the balance of the load but also the load brakes. The load should in no case be slung against a wall or column to straighten it, but if it is out of balance, the foreman should signal for its return to the floor. If the load proves to be well balanced, the operator should sound the gong to warn all workmen not immediately concerned with the movement of the crane, and then proceed to hoist and move the load. On a crowded floor, it is good practice to have a workman precede the load by 20 or 30 feet and warn workmen to stand aside until the load passes. No rides on the load or slings should be permitted under any conditions.

The hookers should be thoroughly acquainted with the relation of stresses in slings at various angles, and the suggestion is made that tables showing this relation be prominently displayed on the sling rack and that metal tags be applied to the individual slings stating rated load, date of purchase and date of last inspection and annealing. The rack, tag and tables are shown in Fig. 7 and in Fig. 8.

The gong should again be sounded before lowering and workmen should be cautioned against standing between the load and a wall or column when the load is near, as many accidents under such conditions have occurred when the load has slipped or twisted. Workmen should stand well away from the load while ropes or chains are being withdrawn, as they may tip the load or whip out with terrific force sufficient to kill instantly.

Should the crane fail to handle the regular service load continuously on the given high speed without dangerous heating of motors or other electrical ap-

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paratus, it should be reported immediately. If a repair gang starts work on the crane, each member should personally place his own padlock on the locking out device of the main line switch. This rule, when rigidly enforced, greatly reduces the hazards of crane repair work. Repair men about to work on the crane runway should first notify the operator, then prominently display a danger target at least 60 feet from the point of operation and also clamp two waterproof torpedoes to the rail a few feet back of the target. In case of emergency, the torpedoes serve to warn both operator and repair gang.

It is urgently recommended that the superintendent devise a book of rules for all crane men and that he keep them primed on the rules by frequent examinations.

AVOID OLD HOLES WHEN DRILLING.

A machine man, in a western mine, was sent to a drift, on Monday morning, and told to set up the Leyner machine and drill the face. He found that the round blasted Saturday night had not broken and that a portion of each hole was left, the back holes in particular being of considerable depth. The shift boss had not reached that part of his run, but there being little muck in the way, the man at once set up the machine and started to deepen the righthand back hole. The hole must have been about three feet in depth and contained some powder, perhaps a stick, that had not gone off when the charge above it exploded. He started the machine drilling slowly for a few minutes. When he turned on a full head of air there was an explosion, knocking him down and cutting him badly about the face and shoulders, and may cause him to lose the sight of one eye. The mucker who had been helping him set up was also badly bruised.

The fact that the machine man was not instantly killed was due to the ground being very hard and tight and to his set-up being good and solid, the drill in the hole receiving the full force of the blow and allowing only the fine dirt to be blown past. The explosion was of sufficient strength to bend the drill between the machine and the breast.

"He is an experienced machine man," says the safety inspector of the mine, "and knew better than to do the stunt he did. The safety rules say not to deepen holes or any part of holes left standing, as they may contain powder, nor shall drilling be done in any 'gun' or 'bootleg' for the same reason. Machine men should always start their holes at a new point in the breast and not in the bottom of old butts. The injured man evidently intended to deepen the back holes and lifters, then by drilling relieving holes in the center, to pull a good round. His intentions may have been of the best but his judgment was d—— poor. In my opinion, he pulled off a 'bone-head.' A man of his experience should have known that there is always a danger of unexploded powder remaining in a hole, especially if the primer is not placed in the bottom. In any case, he must have known that he was breaking a well-known safety rule. But he took a chance, and not only endangered his own life but that of a fellow worker.

"An accident of this kind should teach every machine runner in the mine to avoid all old holes when drilling. This is the second accident we have had during the year from machine men drilling into powder. Both of them could easily have been avoided.

"When at your work, play safety, first, last and all the time."

NON-SLIP BANANA PEEL.

The Department of Agriculture is interested in an announcement by Frederick Boegle, of the Burbank experiment farm, that he has produced a banana with a safety-tread peel. He claims that the skin is as rough as sand paper. Its surface clutches the smoothest pavement, giving perfect traction on leather or rubber soles. Boegle explains that the new fruit was obtained by crossing the ordinary banana with the cactus.

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EYE PROTECTION FOR GRINDERS AND MACHINISTS

By H. W. Davie.

THERE are more risks of injuries to eyes in iron and steel plants than to any other single part of the body. The Pullman Company's accident charts show that 35 per cent of all injuries are eye injuries. Dust, flying particles, sparks and glare, unless guarded against by efficient eye protectors, offer constant and unavoidable danger to the men. This fact is being recognized by safety engineers, liability insurance companies and industrial commissions in various States. Leading liability companies are requesting, and in some cases requiring, their assured to provide adequate protection for the eyes of their men. State officers are beginning to realize their responsibility in this matter and are issuing safety booklets describing dangers of accidents and recommending suitable safeguards for their prevention. This is notably so in California, Illinois, Iowa, Kansas, Massachusetts, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Washington and Wisconsin.

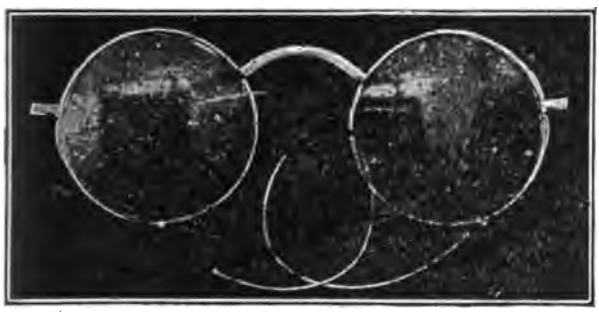

Fig. 1. Glasses after having been used two weeks by a grinder.

Many employers have sought to provide their men with eye protectors and have met with more or less prejudice on the part of the workmen. Many of the workmen believed that glasses would injure their eyes or that they could see better without them, and they have gone on squinting at their work, receiving more or less serious injuries to their eyes, and when actually supplied with eye protectors they have tucked them under their benches and gone on as before. A good deal of this is due to the often met prejudice against anything new. Another cause is that the eye protectors are sometimes so uncomfortable and irritating as to render their constant use impossible. Those objections have been overcome, however, and improvements have been designed which yield perfect comfort as well as complete protection to the wearer. When improved eye protectors are demonstrated to the workmen and the great value of safety glasses is shown, they wear them gladly and constantly. A great deal of patient explanation is necessary to induce the men to try them, but once fairly tried they are fixtures. But it is not only the men who have to be shown the benefits of eye protection. Many foremen do not realize that the numberless minor accidents to men's eyes, causing not only the injured person to stop work to get grit, dust or other particles out of his eye, but a mate to help him, and perhaps one or two others to look on, may all be avoided by the provision of suitable safety goggles for the workmen.

"Small particles are likely to become lodged in the cornea of a workman's eye. Close examination with a magnifying glass will usually show large numbers of minute scars, sometimes so numerous as to dull the cornea and affect the vision," says Dr. Mark D. Stevenson. In a grinding room there are countless injuries to men's eyes which are, in many cases, given little consideration at the time. With so much fine dust and grit flying about, many particles imbed themselves in the cornea of the eye. When these particles are rather large they cause such immediate irritation that the grinder

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leaves his work and calls on the "shop doctor" or some fellow worker to get it out. This, of course, is a very dangerous procedure. The man's eyes may become infected from the use of a dirty toothpick or handkerchief, or the implement used may scratch the surface of the cornea so as to injure it permanently. Sometimes these particles may seem to have been taken out and, as in the case of the fine particles and dust which do not cause immediate irritation, they imbed themselves in the cornea so as to ultimately dull the vision and seriously affect the man's efficiency.

This matter has, up to the last year or two, been given little consideration generally, and few people have realized how vitally necessary is the protection of a grinder's eyes. Without eye protectors he must squint and thus reduce his efficiency, and if he gets emery grit or bits of hot metal in his eye he will lose from five to twenty minutes in getting it out, if it is not bad, and if it is bad, he may lose days and weeks and ultimately his sight.

With all of the fine dust flying about a grinding room where there are numbers of men working, protection at the side is just as important as protection at the front. "Since the particles cut off by wheels are comparatively small a heavy type of goggle is unnecessary. Goggles should have side guards of wire or leather as particles coming from the side frequently enter the eye," said R. G. Williams, safety engineer of the Norton Company, before the National Machine Tool Builders' convention at Worcester. It is readily seen that when there are a number of grinders working in a row it is impossible to prevent the sparks from one grinding wheel flying into another grinder's eyes. After most exhaustive tests as to the best way of protecting grinders' eyes, it has been proven beyond doubt that side guards should be provided on the glasses.

A man grinding high carbon or manganese steels looks constantly into a steady stream of sparks, the glare of which may cause retinal asthenopia. Retinal asthenopia is a condition from which the eye usually recovers after a suitable period of rest, but the loss of sight may be more lasting as the result of prolonged exposure to intense glare.

Fig. 2. The dangerous glare of a stream of sparks has injured many a worker's eyes.

In the industrial world retinal asthenopia is a dangerous condition, partly because of the insidious way in which it works.

A man grinding manganese or high-carbon steels should be protected from the harmful glare as well as from grit and dust. The desirability of light amber colored lenses for grinders' glasses has been proved in the research laboratories of one of the largest manufacturers of grinding wheels in the

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world. Grinders to whom glasses with wide lenses have been given have complained of strain and irritation of the eye and blamed the glasses. The strain existed before, but was not noticed until something new brought it out. At once amber lenses were provided to cut out the harmful rays. There is an anti-sweat pencil on the market which will obviate sweating of the lenses. The effect of this pencil will last for from four to five hours.

It is highly important that a heavy chippers' glass should not be given to grinders, machinists and others who do light work and who do not need such heavy protection. They will naturally object to the extra weight, and to get the maximum co-operation from workmen it is only wise to do away with all possible objections. Another thing which should be given careful attention is the matter of workmen who wear correction glasses. If these lenses are unprotected they quickly become scarred by emery grit and are soon so covered with spots that they are of little use. In the past it has been a frequent sight to see workmen wearing cheap leather goggles (such as are bought in 5 and 10 cent stores) over their regular glasses. The practice of allowing the men to wear such goggles is universally condemned by safety experts. Only goggles of good quality with correct lenses can be expected to give satisfaction; these can be worn over correction lenses more easily than the old style leather dust goggle. It seems unfair to burden a workman with placing high-priced correction lenses in his safety glasses and then having him pay for the many repairs which necessarily follow. In a good sanitary grinders' goggle which can be worn over other glasses and still provide protection from all angles, the workmen receive perfect protection and the cost of extra lenses for the eye protectors is small.

It is surprising to note the number of foundries in which no protection is given to the eyes of such workers as molders, pourers, grinders, men slagging the cupola, etc. The idea that these dangers were "risks of the trade" has been so strong that neither employers nor employes awoke to the fact that not only can much pain and impairment of sight be avoided, but the efficiency of the workmen can be increased and much time and money saved for the employers.

Under the new workmen's compensation laws, employers are required to furnish certain safeguards, but there is nothing to require the men to wear them. After showing the men the advantages of eye protectors, corporations should absolutely require them to wear the glasses for mutual benefit. In some cases the management purchases supplies of eye protectors for different needs and sells them to the men at cost, while other plants distribute them to the men free of charge, realizing that it is but a slight expense compared to the liability incurred if eye protectors are not worn. Since laws and insurance requirements force employers to furnish eye protectors where needed, it is but right that the employer should require his men to make actual use of them. This is an easy matter when they are shown the advantages.

SAFE OPERATION OF BELTS.

There are about fifty miles of belting in the Ford factory, Detroit. Several men have been hurt on belting, because they were careless.

Never take hold of a moving belt to stop a machine, or shift a belt, the manager of the safety department remarks. Where no mechanical belt shifter is provided, slow the machine and use a smooth stick, at least four feet long.

Belts should always be looked after by men prepared for such work. If a belt comes off, notify the foreman.

Never pass through moving belts or try to step over them.

A belt should never be repaired while any part of the machine to which it is connected is in motion.

Do you know what motor supplies the power for your machine? It would be well to find out. Do you know which plug to pull to stop the machine, in case of an emergency? If not, find out soon.

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HOW TO START A SAFETY CAMPAIGN.

National Safety Council.

THE following suggestions are addressed to the factory manager who has become convinced that safety is an indispensable part of an efficient factory organization, and wants to organize his plant so as to secure the co-operation of his foremen and workmen in preventing accidents.

1. Call your superintendents and foremen together and tell them plainly what you have in mind. Lay before them the experience of other companies in reducing accidents and outline the methods adopted. Ask the National Safety Council for details. Agree on a definite programme and make a written outline of the items in the order in which they are to be taken up; the more serious points of danger, of course, should be covered first.

2. Remember the company must show by visible and tangible signs that it means business and will do its part, before it can go to the workmen and ask them to co-operate; therefore the first thing to do is to build safeguards and cover the more serious points of danger.

3. Some one person should be selected to give a part or all of his time, depending on the size of the plant, to the work of looking after the details of safety. He should be known as the safety inspector.

4. During the first six months have frequent meetings of the superintendents and foremen for the purpose of reporting progress, exchanging suggestions and fostering interest and enthusiasm.

5. After considerable guard building has been done, and you have succeeded in getting your superintendents and foremen lined up and interested, then call a meeting of all of your employes. The manager should preside at this meeting and should lay before the men the facts as to the causes of accidents, the large percentage of which cannot be prevented by guards, and the part which the workmen must do. He should frankly state that in the past the company has been negligent and accidents have happened which might have been prevented had proper guards been provided. He should also state with equal frankness that many men have been injured because they were careless and thoughtless. He should say that now a new leaf is to be turned over and the company will go to the limit and will build any guard which is practical, and urge the men to co-operate and all pull together for a safe shop. The superintendent and some of the foremen should also speak at this meeting. If it is possible, have your doctor speak on first aid and the importance of reporting slight injuries.

6. At this meeting appoint a workmen's inspection committee and outline its duties. Make it plain that the members of this committee are to have absolute liberty to make any inspection they wish, and to offer as many suggestions as possible—the more the better. Urge every employe to report suggestions to the committee.

7. Select a safety motto for the shop, such as:

"No Accidents."
"Stop Accidents."
"A Safe Shop."
"Boost for Safety."
"Safety First."

8. Place bulletin boards in each department and post on them such materials as the following:

The motto of the shop in large letters.

Pictures of injured men with stories of the accidents.

Newspaper clippings of accidents.

Copy of suggestions made by workmen's committee.

Analysis of accidents showing causes.

Monthly report of accident records in the various departments.

National Safety Council bulletins.

9. Remember that the secret of a successful safety campaign is to grip the proposition just as you would a new piece of work in the manufacturing end of your business. Convince every foreman that the company is determined to eliminate accidents, and give

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them to understand that they are expected to do their part. Be absolutely frank with your workmen and make them feel that you are going to recognize them; give them a large part in the work, and let them know that you will welcome any suggestions.

A safety campaign should start off with vim; the men should be made to feel that a new leaf has been turned over and everybody is to take a new start; a sort of "all pull together" spirit should be fostered. An enthusiastic start will do more to jar the men loose and awaken interest than months of humdrum plodding effort. One manager who reduced accidents 50 per cent the first year was asked how he did it. He replied, "I made a noise, and I kept right on making a noise until every man in the shop got to thinking about safety."

NOTE:—Other activities which will be helpful.

Start a safety campaign in the schools. The children will carry the message home and help to increase the interest of the parents.

Ask the ministers to conduct a safety Sunday.

Secure publicity in the local papers.

Have moving picture films run in the local theaters showing such films as "The Crime of Carelessness," etc. Write National Safety Council headquarters for list of available films.

ELECTROCUTION ACCIDENTS.

Editors, SAFETY ENGINEERING: The Richmond (Va.) newspapers contained an article last week about the death of an aged negro, Nelson Haines, an employe of the Hehslen Packing and Commission Company. This negro, who had been in the service of the firm for many years, attempted to extinguish a small fire caused by crossed wires, with a pail of water. As soon as the water touched the flames he toppled, fell and died immediately.

If you have any method of knowing the number of electrocutions caused by use of water on electrical fires each year, I am sure that you would find it very great. This field is an excellent one in which to expand your efforts.

I have a suggestion to offer. Electricity is universally used and causes a great many fires. It would be possible to extinguish these fires without danger with pure distilled water, but ordinary water contains mineral matter which conducts electricity. Very few people know that it is unsafe to use water on electrical fires.

In every place where electricity is commonly used, employers should be required by law to place a notice such as the one recently published by the Eastman Kodak Company, of Rochester, N. Y., warning the people against the use of water on electrical fires. In addition to that the law should require that efficient and safe methods of extinguishing the many electrical fires be provided. E. C. A.

FATIGUE.

Fatigue is the state of being tired. Rest is its only cure. One set of muscles strained by constant use, may affect other muscles. When this happens, we say we are fatigued. When the body is tired, the brain becomes tired, and for those whose work is not muscular, but mental, the opposite is true—the body feels tired when the brain is overworked.

An experiment showed that a man who had thoroughly tired the muscle of only one finger, was not able to use his brain to teach a class until he had rested.

We must rid the body of the results of fatigue and overstrain if we are to remain good workers and to live long. The remedy is rest, says Dr. Lee M. Frankel.

Fresh air, rest, and good food restore and refresh tired bodies. It is not resting to force oneself to take a five-mile walk or violent exercise when the body feels unable to do it.

Hearken to the warnings of the body. The constantly tired person is the more apt to be overcome, exhausted, and completely weakened by illness, and requires a longer time for recovery.

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SAFETY IN STAMPING OPERATIONS.

No single machine used in industrial operations is responsible for so high a percentage of serious accidents as the stamping press, and it is fair to state that no other machine has received more careful study with a view of eliminating the hazards, and several very effective guards have been the result of that study.

Most of the devices produced, however, are more or less limited in their scope; that is, they are very effective in certain operations, whereas they have proven themselves absolutely ineffective under other conditions. A universal guard which will meet all conditions has yet to be designed, and among experts on stamping operations the task has been pronounced an impossible achievement.

The Brown and Sharp Manufacturing Company of Providence, R. I., in whose shop a great deal of stamping is being done, has for years paid close attention

Fig. 1. Use of Chute to Insert Work and Stick to Remove Work.

to the different devices and methods designed to reduce the hazards to the operator's hands in stamping operations, and the four photographs shown herewith are indicative of what they have achieved.

Fig. 1 shows the use of a chute through which the stock is inserted, thereby obviating the necessity of the operator's hands coming in the immediate danger zone of the die. The operator is also shown using a stick to remove the work after it has been punched or formed.

Fig. 2 indicates a punch press with a

Fig. 2. Punch Press with Sliding Die Bed.

sliding die bed so arranged that the work can be placed in position when out from under the punch. The whole operation is performed without the workman's hands coming at any time directly under the punch.

Fig. 3 shows the same arrangement, but gives a better view how the work is being placed in position when out from under the punch.

Fig. 4 indicates the use of tweezers used also to avoid putting fingers under the punch.

Whereas the method as a whole, as here indicated, is simple and undoubtedly would be condemned in several shops as entirely ineffective for the season that it depends too much on a human equation, whether or not the practices are properly adhered to, still the Brown and Sharp Company reports that during the several years it has employed these methods, it has not had a single case of a workman being injured in the punch press department. This, however, has been achieved largely through rigid dis-

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Fig. 3. Punch Press with Sliding Die Bed. Work Being Placed in Position When Out from Under Punch.

cipline and enforcement of the rule that the hands shall never be placed between the punch and the die. Where the work permits it, the presses have been equipped with a guard which will prevent the press from acting until the workman's hands are removed from the danger zone, but it is admitted that there are different kinds of work where such a device would seriously interfere with the efficiency of the punch press, and in this case the method as here illustrated is used.

There is yet much to be desired in the field of punch press accident prevention, and it is to be hoped that the designing engineers of punch presses will give as close attention to this feature as they have to the efficiency question in the past.

Fig. 4. Use of Tweezers to Avoid Putting Fingers Under Punch.

PROTECTION FOR PRINTING PRESSMEN

This illustration shows a well designed and highly efficient type of a guard for a cylindrical printing press.

Belts, pulleys and flywheels are encased in such a manner that, while easy access is given to the parts, an accident is almost impossible.

The foreman must know and keep "Mr. New Man" instructed in safety.—*R. C. Salisbury.*

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EFFECTIVE SAW GUARD.

Great effectiveness is claimed for the saw guard shown in the accompanying pictures. It was designed and made by the E. & T. Fairbanks Company of St. Johnsbury, Vt., and, according to the statement, the company has used it with great success in its works.

The particular feature, to which attention is directed, is the circular rotating spreader instead of the usual fixed knife-shaped type. This is claimed to be original in the design.

The saw guard would present a neater appearance and would undoubtedly be more practical if iron netting, instead of the solid plate hood, were used. Objection is raised also to the very heavy and clumsy appearance of the supporting structure. However, this is a matter of design and could be removed easily. The real question is, Will it prevent circular saw accidents? Results seem to indicate that it will.

FOR THE BULLETIN BOARD.

Warnings in a safety bulletin of the Utica Mutual Compensation Insurance Corporation:

Don't wear loose or torn clothing, long ties, aprons, or unbuttoned jumpers when working about machinery.

Never disregard a warning sign.

Don't work with unsafe tools. Never use tools with loose handles or burred heads.

Warn your fellow-workman when danger is near. You may save his life.

Don't step on protruding nails in loose boards. Bend the nails over, and throw the board aside.

Remember: The right way to do your work is the safe way.

SAVE THE CHILDREN.

S. G. Watkins.

During the last twenty-four years 31,049 children under 18 years of age have been killed or injured in the United States while tresspassing on railroad property. Prevent your child from being added to this number. Teach the children:

Not to walk on Railroad Tracks.

Not to play in Railroad Yards or about Stations.

Not to cross a Railroad Track without first looking in both directions.

Not to throw stones at trains. This thoughtlessness frequently results in life long injury to innocent people.

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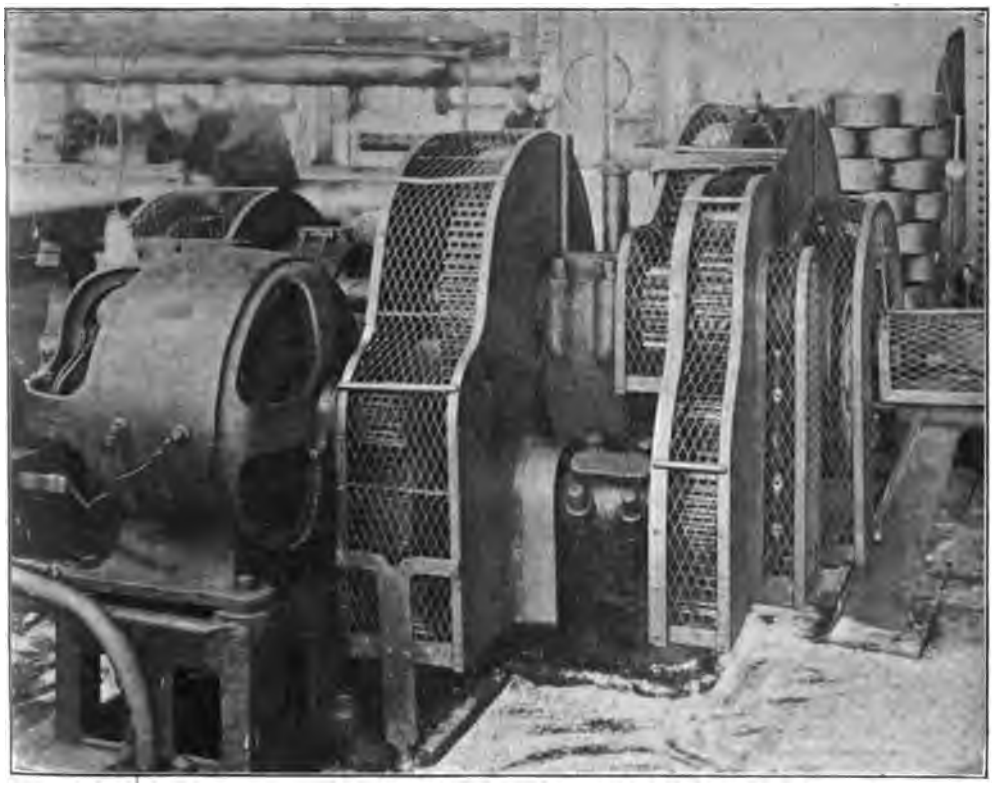
A WELL GUARDED MACHINE.

A good illustration of a completely guarded train of gears is shown herewith. It is a coupling screwing machine in the lap mill of a large pipe plant. The gears are enclosed completely with shields of sheet iron, expanded metal and angle irons, a combination difficult to be improved upon for the permanent guarding of gearing. It should be noted that the shield in the foreground is supported by a post socket, thus facilitating the removal of the guard for cleaning and adjustment of gears. The other shields rest directly on the floor and can be removed by lifting vertically. It should be noted also that the projecting spindle on the right is protected adequately, without causing any interference in the making of adjustments.

The suggestion is, however, that the use of sheet metal on the face of the gears with expanded metal, punched plate or screen on the sides, would be a better practice. This would afford a view of the line of action between the gears and would also protect the gears from the settling dust, which soon gums them.

A motor in the exposed position as the one in the foreground should, of course, be protected by covering completely all rotating and live parts, and by grounding the casing and placing the feeders in conduit. With this additional protection the entire guarding would be ideal.



Coupling Screwing Machine. Shields over All Gears and Moving Parts.

Public service officials should give the matter of Safety First their attention, because there is no other business which comes so close to the people as that of the public service companies.—*Electrical Review.*

The time is not far hence when accidents in American industry will be a thing of the past, when men will go about their daily duties with the certainty that no harm can come to them, and when the ones at home will not live in constant anxiety for those who are earning bread.—*Arthur Williams.*

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CAR DERAILER.

The American Car and Foundry Company deems it desirable to compel the observance of signals of caution as well as those of danger. Flags, targets and other forms of signals must depend on the human equation, to be observed and have their directions acted upon—the weakness of plain signals.

The derailer, working in conjunction with a target signal, compels compliance with the rules, because it will throw a car or locomotive off the track, if it is being sent past a signal set to stop. It will derail from either direction.

"Hayes" Derailer. Will Derail a Car Going or Coming.

A de-railer, similar to the one shown in the illustration, is of great value to protect men working around cars on the tracks or to prevent careless switching crews shunting a car into a shop without notifying the men working inside.

GUARDS AROUND STRAIGHTENING MACHINE.

Here is an example of painstaking effort to safeguard a dangerous machine, effected by the Ireland Steel Company. Not very long ago one would have found the backgears on the motor running open to all the world. Note that, while this is a step in the right direction, it would have been better if the guards enclosed the gears completely.

Another good thing is the guard rail to prevent unnecessary walking around the motor and gearing.

Straightening Machine Safeguarded.

TUBERCULOSIS IN INDIANAPOLIS.

Comparative death rates from tuberculosis in nine cities for 1913 are cited by the Indianapolis Rotary Club as follows:

Cities.	Per Cent.
New York	6.16
Baltimore	8.58
Boston	8.97
Philadelphia	10.15
Chicago	10.94
Indianapolis	11.20
St. Louis	11.41
New Orleans	11.58
Cincinnati	13.18

The Rotary Club calls attention to the 1914 death rate from tuberculosis in Indianapolis, 12.08 per cent. The backwardness of Indianapolis in providing beds at public expense for tuberculosis patients is thus shown: Indianapolis, 25 beds for 233,650 population, or one for every 9,346; St. Louis, 250 beds for 687,029 population, or one for every 2,748; Boston, 637 beds for 670,585 population, or one for every 1,052; Chicago, 2,300 beds for 2,185,283 population, or one for every 950.

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"THE MAN ON THE JOB"

COMPETITIVE ARTICLES RELATING TO THE PREVENTION OF INDUSTRIAL ACCIDENTS BY EDUCATION OF WORKMEN, METHODS OF MANAGEMENT AND MECHANICAL SAFEGUARDS

183 "THE MAN ON THE JOB" AS A SAFETY ENGINEER.—The particular individual referred to in the heading should be found at the head of every great undertaking, also in every pursuit where labor is performed; from the manufacturer of pins to the building of a skyscraper or a modern battle ship. Every avenue where skill and labor are required should find him at the post of duty.

The men who manage a business, wheel dirt or man the great guns which skill and inventive genius have made possible, stand side by side in their respective stations, and are equally responsible for safely performing the duties of their occupations. Each one sharing responsibility, therefore, should make "Safety First" the watchword, if we are to minimize accidents—a noble work and worthy of our best efforts, remembering that self preservation is the first law of nature.

Our great railway managers have spent millions in equipping the railroads of this country with safety appliances, the maintenance of which costs large sums, and yet, were the man who sits begrimed in his cab, amid the rush and roar, driving his iron horse into the face of night, to forget for one brief moment his orders, a fixed signal, or fail to whistle out a flagman to protect the rear of his train from the following section, what awful consequences would follow! To his care are entrusted precious human lives and much valuable property. His long training has made him familiar with the responsibilities of his chosen calling; the sign of "Safety First" is plainly written on his brow, and how well he performs his duties is told by the small percentage of lives lost compared with the great number that his watchful care lands safely.

The captain of a great ocean liner sails from port, colors flying, his ship in trim, hold filled with freight, a full passenger list, hatches battened down, openings into various compartments bolted fast, and life-saving apparatus in place and of easy access—everything done to make the passage safe. We watch this ship proudly sail toward her destination. Not a thing, so far, disturbs the quiet of passengers or crew. The sentinel on watch observes a dark spot ahead, immediately reporting same to his superior officer, and as we approach nearer the outlines of a well defined fog bank, the terror of all mariners, looms up directly before us. Presently it closes in upon us and the doleful tones of the fog-horn sound at intervals. The ship slows down; the engineer and his faithful crew, somewhere down in the ship's internal regions, stand by and answer the first signal. The watches are doubled, the lifeboats made ready. And why are all these precautions taken? Because captain and crew have been trained in "Safety First" methods, and are prepared for an emergency should it arise. And how many lives have probably been saved by the carefulness of such men as "go down to the sea in ships."

Our modern buildings of concrete and steel, towering skyward several hundred feet, magnificent in architecture, perfect in outline, construction and detail from basement to roof, stand, when completed, a monument to the designer's and the builder's ability. But should they fail to

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impart to their men proper instructions as to safety, or should the men fail to obey instructions and the rearing of the building cost a life, as a result, the building will stand also as a monument to the dead and a blot upon those whose duty it was to safeguard the men whose labor made its completion the success of the architect's plans. Therefore, each workman on the job should be a safety engineer.

The first two descriptions point to men who received a training of many years to fit them for their duties. That the necessary training of men for any position where there is a chance of injury should be given before placing them at such duties, is, therefore, apparent. How often do we hear the remark, "I did not think it was dangerous," after an accident has happened. Many such accidents would have been saved by proper training under competent men alive on the subject. This training should include medical examination and a close inquiry into one's experience, before a man is accepted for extra hazardous employment. Medical examination may find the eyes defective, or a weak heart, unfitting a man for the position sought. Such men should be given employment suited to their conditions. Such a course should make the average man more competent and prepare him the better to care for himself and others. Training will also bear good fruit in making a man valuable as a "Man on the Job" Safety Engineer, when once the importance of matters relating to accidents is thoroughly instilled in him.

The prevention of accidents and injuries by all means possible is a personal duty which everyone owes, not to himself alone, but also to his fellow workmen; and a word of warning, a helping hand or an obstacle removed, has saved many an accident. Every workman has his duties to perform, and the most important one is to perform them in the safest possible manner to prevent injury. To do so he must *think first, obey fixed rules and accept good advice.* Having done this, he will have become a recognized leader in a movement which is becoming nation wide for the conservation of human life.

184 CONVINCE WORKMEN OF THEIR VALUE BY TEACHING "SAFETY FIRST" PRINCIPLES.—There are a few points about factory, foundry and machine shop inspections that I consider of even greater value than the guarding of exposed moving parts of a machine. We will take the machinist for an example. Nine out of every ten machinists when told that all the gears, belts and pulleys on his machine are to be guarded, will say that a man cannot possibly get caught in the gears or belts unless he deliberately places his hands on same; or, he may say that the guards would interfere with his work, or perhaps quote something else, hoping to condemn the use of guards on his machine. Some will say that they have been working on that particular type of machine for ten or more years, and yet they have never met with an accident.

It is a very good idea to speak with such individuals, explaining the real motive of the "Safety First" movement. During the course of my inspections I usually lay for such men. When I find one I first make him feel that he is of great value to his employer, and should he lose a hand, finger or even part of a finger, everybody concerned is a loser with the exception of the doctor. I usually explain just how an accident can happen. Sometimes a man may slip on the floor, and to break the fall may catch hold of the lathe, and possibly the exposed gears section. I make him imagine the results should his hands or fingers come between the gears. I have convinced many by having a few minutes talk with them, and oftentimes they have pointed out several points on a machine which I would not consider hazardous, but which they would convince me were hazardous points and that they should be guarded.

It would be well for all safety inspectors to spend a few extra minutes on an extra hazardous machine, explaining to the operator the danger connected with the machine he is operating. It is also well to impress upon his mind that his hands, if he is a master of his duties, are as valuable to his employer almost as they are to him. I appreciate the fact

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that an insurance inspector's time is limited, and that many cannot give such matters as I have outlined, their due consideration, but we must always remember that that which is not worth doing right is not worth doing at all. The inspector being the real "Man on The Job" is the fellow who can decrease the number of accidents, both those caused by some neglect of the employer and those caused through the employe's neglect. No two factories or shops are alike, and a thorough study of each factory an inspector steps into for the purpose of inspecting must be made. First study the superintendent and foremen of the departments, and then the employes, and then deal with them accordingly. If you can convince a foreman that a certain machine in his department should be guarded you will rarely have any trouble with the men above or below his standing. Tact and diplomacy, and plenty of it, must be used by all inspectors, particularly by insurance inspectors.

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185 SAFETY IN THE GAS INDUSTRY.—Safety questions applying to the gas industry were published in The Man On The Job department of SAFETY ENGINEERING, April number, as follows:

2. Are there shut-off valves outside of the oil pump buildings to be used in case of accident, and do both the day and night forces know the location and use of such safety shut-offs?
4. Where is pentane stored and how?
5. What type of lights are used in purifier houses? How are they protected?
7. How many men are used to charge or purge a purifier box?
11. How is tar separator guarded?
14. How are seal pots guarded?
18. In what manner are intake ports of blowers guarded?

I submit replies to the foregoing questions as follows:

Reply to No. 2. Valves are placed on the suction lines at the oil tanks as well as at the pumps. The delivery lines are valved at the pumps and at suitable points in the line to isolate sections as required. They are valved again on the working floor in more than one place. An additional safeguard that is frequently employed is to provide a special drain line to pump the main delivery line clear after the valves are closed. The foremen in charge of the outgoing and incoming shifts inform their respective reliefs as to any valves left open or closed differently from usual practice. Also all important valves are numbered and indexed in the valve book, and opposite each entry is the record of its state—open or closed, by whom and for what purpose, as well as the date. The foreman's Daily Operation Sheet or Log also contains the number of the oil tank being used. The valve book, together with a large key plan, is placed immediately over the foreman's desk.

Reply to No. 4. Pentane is stored in small cans in an ice box or refrigerator. The cans are hermetically sealed with solder.

Reply to No. 5. When electric lights are used, the bulb is enclosed in an hermetically sealed (by the use of a washer or other material) heavy glass globe that is sometimes additionally safeguarded by a wire frame. When gas is used, lanterns are built right in the walls, the glass being flush with the inside face of the wall. The gas supply, air inlet and products flue are all on the outside of the building, from which the lamp is lighted and maintained. Sometimes a large sheet of mica is employed in place of the glass. In both cases, the gas, by actual contact, and the filament in the event of breakage, are effectively prevented from igniting an explosive mixture, which might readily occur when changing oxide, purging, etc.

Reply to No. 7. When it is considered that purifier boxes are of all sizes and depths, and may be circular or rectangular, indoors or out in the open, loaded by hand conveyors or industrial railways, discharged by the same agency or the spent material dumped through chutes in the floor of the box, it is readily seen that the question is practically impossible to answer without further data. The nature and age of material, style of grids and thickness of layer required are all controlling factors, as well as the cover construction, which may be wet or dry seal, and whether hand (*i. e.*, winches) hydraulic or other power is

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employed for lifting, lowering, and transporting the cover. It is also suggested that the word "purge" probably employed here as meaning to empty or discharge, is practically a standard word throughout gas works to designate the operation of expelling all the air from the oxide, and between the layers, after the cover is down, and before putting the cap on, or turning the equivalent cock in the cover, which is done immediately before the box goes into service. The most vital hazard in purifier house work is in raising the cover after the gas is shut off (especially with coal gas and oxide with a high sulphur content) and discharging the fouled oxide. The danger to be guarded against is to prevent firing and the consequent ignition, with explosive violence, of any entrained gas in the oxide and between the layers, and to ward against asphyxiation of the men working in the box, which even if unattended by fatal results has a decidedly bad moral effect on the organization.

Reply to No. 11. The tar separator, whether above ground or sunk to ground level, is protected by hinged iron covers and a guard rail around the entire vessel.

Reply to No. 14. Seal pots are generally covered with iron plates cut to fit dip pipes, and frequently split to facilitate removal for examination and cleaning. An additional guard is a pipe rail, whether sunk or elevated pots are used.

Reply to No. 18. Intake ports of blowers are best guarded by closefitting, fairly small mesh, heavy gauge wire guards bolted to fan case.

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186 EFFICIENCY AND SAFETY—HOW THEY ARE TO BE OBTAINED. — That safety would result in efficiency would scarcely be doubted, but that efficiency could result in safety is, in the minds of many, a debatable question. Let us see how safety may result in efficiency. Taking the corresponding months of 1913 and 1914 in a large industrial institution employing several thousands, the time loss per employe for 1914 through accidents was only 40 per cent of that of 1913. As it is conceded to cost about $35 to train a man in the average industrial position, and many of the positions must be filled at once, even though the injured man is absent but a short time, it is, therefore, extremely important to keep down accidents. Every foreman understands the importance of maintaining an unbroken organization. His ability as a foreman may well be judged by his ability to maintain an unbroken organization. A low accident rate will be one of his greatest assistants.

Those who are injured several times, and are forced by these circumstances to be irregular in attendance, soon form irregular habits, thereby creating an unsteadiness in the whole organization, and by this means inefficiency. Once a man is in the employ of a reputable company, he is not dropped because he has become injured, even though he has been partially incapacitated. After an employe has lost but one of his members he is very much like a partly broken-down machine, more or less limited in his ability to turn out work.

Efficiency may result in safety in many ways. Let us first consider the machine operator. Every element of cut and try is removed. He sets up his machine according to instructions, and goes forward with the job without the necessity of shifting belts and gears to try for the proper cutting speed, and by having the correct speed, does not have to take a chance on breakage, due to overloading his machine.

The first element in efficiency must be thought (constructive thought). So also must thought precede action if we are to accomplish safety. Trained engineers are an absolute necessity in the planning department, and equally important is it that we have engineers in the safety department.

The efficiency engineer first looks to the condition of the shop equipment. How well he knows that upon the fitness and mechanical condition of each individual machine and appliance depend his success. Each piece of equipment must undergo a rigid examination. If a defect is found it is sent to the machinery hospital for repairs. With all machines in perfect condition, the organization of the shop work can go forward with the greatest of certainty. The efficiency man

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knows that with this kind of a foundation, each operation may be assigned to the proper machine, and this machine in turn will be capable of performing the work in hand.

By way of comparison, just note how closely the safety engineer's work should follow that of the efficiency engineer. In the first place, he should look over the shop as regards working conditions—food supply at noon, ventilation, sanitation and toilet facilities. Next a thorough examination and record of the physical condition of his human machines. Then see to it that the proper work is given to each, which he is best suited to perform. Once the proper man is on the right job, a great deal has been accomplished for safety. But this is not all, for instead of thinking for this human machine, you must lead him up to a habit of thought, where thought will precede action. When this condition is attained then the most wonderful of all mechanisms—the human machine—is working for efficiency and safety.

PRIZES FOR JULY ARTICLES.

First Prize. No. 181. *William P. Strickland, General Inspector, New York & Queens Electric Light & Power Company, Long Island City, N. Y.*

Second Prize. No. 178. *V. Von Starzenski, Superintendent, Mohawk Gas Company, Schenectady, N. Y.*

Honorable Mention. No. 179. *Hubert S. Wynkoop, Electrical Engineer, Department of Water Supply, Gas & Electricity, New York City.*

Other meritorious articles were contributed by Treve Collins, Jr., Secretary to the Purchasing Agent, Edison Electric Illuminating Company, Brooklyn; R. E. Simpson, Travelers Insurance Company, Hartford; William J. Tewksbury, Factory Superintendent, Automatic Electric Company, Chicago, Ill.

COMMENTS BY MEMBERS OF THE COMMITTEE

I like the third paragraph of 177 in describing the manner in which they have been receiving packages from the other manufacturing concerns, including barrels and cable reels, etc., which have had protruding nails, metal straps, etc., injuring the men whose duty it is to handle and unpack them. How they watched these conditions—how, as stated by the writer, 12,000 packages were unpacked without a single injury is valuable information. It is just such things as these, when watched closely, that bring results in accident prevention. His monthly appointed safety committee is interesting; also how the safety movement started in one part of the plant and gradually swept through each department until the whole plant was working toward accident prevention.

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Of the articles under the head of "The Man on the Job" in the July number of SAFETY ENGINEERING, I would suggest that credit be given 178. The author is evidently "on the job" and alive to the hazards that confront a man around a gas plant. He apparently has kept pace with safety suggestions, and by drilling these into the minds of the men considerable is accomplished. Each man must be his own safety committee. By his individual carefulness and readiness to follow suggestions, he becomes of value to himself, to his employer and to the cause of safety in general.

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My vote is cast for 179. The writer of 182, a very good article, comments on the relatively low rate of accidents among electrical workers from electric shocks and burns. Would 15 per cent be a low rate for accidents from any one cause in any other subdivision of industrial employment? What other employment affords the same opportunity for accidents to unsuspecting persons not directly engaged in the work of manipu-

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lating apparatus connected with their employment, as afforded by electrical equipment? If it is installed with ordinary care for avoiding accidents, the relative percentage of shocks and burns to other accidents will not seem to be high, because the factor of opportunity is low. Experience teaches us the importance of grounding secondaries is not considered as seriously as it should be by many electrical engineers.

I consider 178 the best, as this party states a well known but disregarded fact of this time. With the safeguards that can be applied today and the instruction and warning that are posted, it is the careless man who suffers and causes others to suffer with him. Another point I like in 178 is the way he gets down to facts and states how to overcome the hazards. Gas plants are somewhat of an unknown hazard to the outside man, and I believe this article will be read very thoroughly by many.

I have read the articles in "The Man on the Job" section, and in my opinion article 181 is the best. I believe that getting the co-operation of the men is one of the vital elements of accident prevention. The idea of teaching the men how to render first aid to those who receive an electric shock is very good. Meetings with the men where accidents and the prevention of the same are discussed is a very good idea, and, as the writer states, will win their co-operation. For second prize I vote for 182.

In reading over the articles in the "Man on the Job" series for July, I believe the writer of 178—"Safety at the Gas Works"—should be given the first prize. His article is exceptionally well written, and deals with actual practices, as well as giving some very valuable safety suggestions in connection with the general practice around the average gas plant. No. 181 I consider second best in value, and believe he should be awarded the second prize.

No. 177 I consider the best article, for the reason that it follows somewhat along the lines that our company is pursuing in regard to accident prevention. I think the way the purchasing department of the Edison Company of Brooklyn started the "Safety First" movement is a good one.

No. 179 impressed one great thing on me—regarding the switch being inclosed to insure a person from burns. This is important. In electric hazards it is easy to have all inclosed, so that when a switch needs to be operated the operator will always be protected. No 182 amplifies this statement by declaring that 15 per cent of accidents are from burns.

Article 181 is my choice for first prize in the July issue. I like the idea of demonstrating practical methods such as he suggests in his article. His manner of detaching a victim with safety from a live wire, also of how to open a locked jaw, and his persistence of instructing the men after being ridiculed time and again, demonstrates what can be gained for "Safety First" by persistence.

My reason for selecting article 177 is that the writer shows a thorough knowledge of the principles of accident prevention—all the ways possible seem to have been utilized to interest the men and to prevent their injury, not only from serious accidents, but from the minor hurts that annoy, and so lower efficiency.

No. 181 is my first selection, with 178 as second choice. These articles show the practical working of "Safety First" methods, and should be of great assistance to those honestly striving for the benefit of others, who, through ignorance, place themselves in unnecessary danger.

I cast my vote for 178. I only wish each and every article could receive a

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prize; they are all good. No. 178 however, tells us just what to do, and that is what we all need; tells us what to do prior to the accident, rather than what should have been done. Second prize should go to 180.

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I have carefully read all articles under the head of "The Man on the Job," and find that they all give a great deal of food for thought. But from my view of them I would choose 181 as best. I believe a personal demonstration of how an accident might happen, or taking care of accidental cases, followed by a general discussion of the cause and how it might have been avoided, will leave an impression never to be forgotten and cause the men to be more careful.

❦ ❦ ❦

I have chosen article 179 to be given first place. Electric current is used in practically every branch of industry, and by protecting workmen from shocks one of the most general causes of serious accident is eliminated.

❦ ❦ ❦

At a time when electricity plays such an important role in the world's progress, any clear cut suggestion for preserving human life against the dangers possible in the use of high tension current, deserves recognition. Such a suggestion I hold that written by 182 to be.

❦ ❦ ❦

The writer of 177 has given us an outline of the way in which his company carries out the recommendations of the safety committee. I am aware that many a man has been scratched by nails protruding through boxes and panels; many a fall has been caused by a rod of iron or a round roller of wood left where some person could step on it. I therefore cast my vote for 177.

❦ ❦ ❦

Referring to "The Man on the Job" subject, beg to advise that 178 is my choice for first prize, as the article covers about every possible danger point in the gas works.

❦ ❦ ❦

No. 181 is the best article to my mind, as it gives much food for thought. It deals with broad fundamentals and in consequence it can be applied to specific problems in a wide range. One especially good point made is the necessity of disabusing workmen of the idea of fatalism in accidents. I do not recollect having seen this concretely mentioned elsewhere. We are all familiar with the common saying that "accidents come in threes," and it seems to me that such a notion will inevitably lead to the second and third accidents by seizing on the imagination and paralyzing the will at a moment of emergency—frequently of an emergency constantly met and automatically guarded against.

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After having read the various articles under the heading of "The Man on the Job," I consider 181 as the best article in the July issue. One statement in this

CONDITIONS OF COMPETITION

SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.

The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of and interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.

The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.

Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.

Contributors are requested to be as concise as possible. Articles should not exceed the limit of 800 words. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.

Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.

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article covers the basic law for the prevention of all accidents; namely, "That there is a cause for everything must be thoroughly taught, and if rightly presented the way will be clear for the right habit of thinking." All plans for the prevention of accidents must be based upon this broad principle of making the workmen understand that there is a cause for everything. When this principle has been thoroughly instilled in the man's mind, the way for working out a solution of every hazardous operation becomes comparatively easy.

No. 181, "Prevention of Accidents and Welfare Work," is selected largely on account of the greater range of adaptability of the preventive measure discussed, it being difficult for a member of the Committee of Awards to use any fairer method in selecting the most helpful paper when the subjects treated vary so widely as in the valuable articles printed in the July issue of SAFETY ENGINEERING. Appreciative mention is made of the practical suggestions contained in No. 178, "Safety at the Gas Works," applying to conditions usually found in gas producer plants.

I believe that 178 is the best in your "Man on the Job" department in the July number. I consider this article best because the writer not only describes methods of safeguarding the principal danger points in a gas works, but he also suggests a good practical organization for promoting safety education that is applicable to almost any industry.

No. 178 receives my vote for first prize. The writer has gone deeper into detail than any of the others in the current issue, and has composed a very satisfactory safety article. No. 182 deserves second prize, and should run 178 very closely.

For first prize I vote for 178. I am going to forego any remarks this month, because electricity is too far out of my line, and also because these gentlemen seemed to have handled their subject in a masterly manner, but 178 struck me as being entitled to first place.

I cast my vote for 179 as being entitled to first prize, and for 182 as entitled to second prize among the articles contributed to the department entitled "The Man on the Job," in your issue of July, 1915.

Article 181 teaches efficiency in preventing accidents and methods to be employed when the preventing fails. It speaks of actual experience.

I cast my vote for 181 for the first prize, on account of its having the highest percentage of safety advice.

No. 181 is my choice as it shows practical understanding of how to reach men under criticism and the necessity of persistence.

I believe 181 is the best article, because it emphasizes the all important matter of education and description of acceptable educational methods.

I cast my vote for 181. The writer clearly demonstrates in his article the advantages derived by systematic Safety and Welfare Work.

RESULTS OF SAFETY WORK.

The Commonwealth Steel Company's statistics show that for the period July to December, 1912, when the safety campaign was inaugurated at the plant, accident compensation payments amounted to 2.08 per cent of the payroll; during the period July to December, 1914, 0.85 per cent. Part of the safety education has been accomplished through the distribution of a book of safety rules, and by posting safety literature and National Council bulletins.

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"THE FIGHT AGAINST FIRE"

COMPETITIVE ARTICLES RELATING TO THE CONSERVATION OF LIFE AND PROPERTY BY FIRE PREVENTION AND DEFINING FAULTS OF CONSTRUCTION AND HAZARDS OF PROCESSES

No. 66 HEAT RADIATION—HOW IT IS COMBATED IN FIGHTING FIRE.—While the phenomena of heat radiation has been present in fire since that element has existed, it is only lately that general discussion of its features and proper considerations have been given it in fire-fighting. True it is, that men engaged in the work of fire-fighting have always realized its presence and combated its affect, in most cases effectively, but with rather a vague understanding as to the reasons for their action.

Science has discovered that transmission of light and heat through matter and space is effected by the action of molecules and electrons, but to avoid a lengthy discussion, and to present this subject in plain terms, it will suffice to say that where heat is developed through any form of action, combustion, friction, etc., it cannot remain local, but will expand and extend in one of two ways, viz.: by conduction through molecules of matter, or by radiation through the atmosphere. As to the subject in relation to fire, we first meet it in ordinary fires where combustion takes place in enclosed spaces, as in rooms or buildings, and the men operating therein feel the heat transmission at points distant from the place of combustion. Where a fire has progressed so as to envelop a building, the heat developed will affect the surrounding atmosphere—rays and waves of heat radiating out in straight lines. The surrounding property will be subjected to a drying process; the temperature being raised, objects at a considerable distance will burst into flame, although the actual fire has not apparently crossed the intervening space. When heat waves are projected toward surrounding property, and window trim, roofs, etc., are beginning to smoke, stone cracking and falling, powerful streams must be directed high and in wide sweeps between the fire and menaced property.

In conflagrations which have visited cities the fire-fighting force has been at times outflanked by the heat, either through loss of time in shifting lines, or the lack of sufficient force to hold positions until the arrival of the reserve force, resulting in the abandonment of lines and apparatus, the breaking down of the force and the general rout of the department.

Two instances, of which I was an eye-witness, were in April, 1908, when fire broke out in a building 75 feet high, 25 x 200 feet in depth. Directly across a 60-foot street was a large department store. The fire gained great headway in the first structure and burst through the roof. Four engine companies operating playpipes were placed against the south wall of the department store and with powerful streams forming a curtain of water between the fire and the store, swept the entire front, while employes of the store kept streams across the windows on the outside. More than 200 windows in the department store were broken from the heat waves, but the fire did not enter the building.

At a fire in 1909, a wholesale grocery house across a 75-foot street was endangered through heat radiation, but owing to effective streams from the high pressure system a conflagration was averted. In checking radiation at a fire, three

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things are necessary—a sufficient supply of water, the proper placing of streams, and the proper manipulation of same.

Where endangered buildings are equipped with sprinklers, the heads protecting exterior windows should be fused. Where there are tanks on roofs, gutters may be stopped up, and by flooding the tanks and roofs the overflow will form a curtain. Where surrounding property is in danger, streams should be directed to the leeward, high, and moved steadily and slowly to form a curtain. They should be wetted down thoroughly, using hose streams from hydrants, engines or house-lines from building equipped with standpipes, and with buckets.

❦ ❦ ❦

No. 67 THE CHEMICAL EXTINGUISHER AS "FIRST AID."—The fire pail, chemical extinguisher and automatic sprinkler constantly remind us that the great majority of fires are small at the start, and we know that the proper use of any or all of these appliances will extinguish a fire upon discovery, or at least hold it in check until organized assistance arrives. But aside from those buildings and places which are compelled, either by law or by the underwriters' requirements, to instal these auxiliary aids, we seldom find any preparation, in dwellings especially, for the unexpected blaze. Instead reliance, almost criminal in its extent, is placed upon the fire department, regardless of the fact that the apparatus might be seriously delayed in answering the alarm, or may be out to another fire, which would mean a wait of many minutes before distant apparatus could respond to our call.

In cities and towns having a street fire alarm box system, this lack of foresight on the part of the public in general can be overcome, I believe, by simply placing a chemical fire extinguisher, the 3-gallon type preferred, at each street box. It should be properly encased in weatherproof material, hung flush beside the fire box, and so arranged that the door of the case would be released as soon as an alarm is sent in from the box adjoining. Thus a policeman or any person of average intelligence, upon discovering a fire, would have placed in his hands a valuable and most effective means of combating a fire until the firemen arrive, and precious time would not be lost running excitedly about looking for water, or something to hold it, as is usually the case at present—the fire gaining headway meanwhile.

To discourage possible theft of these extinguishers, they should be stamped or marked in some manner which would make them easily recognized should they be offered for sale, and the tampering with any box containing an extinguisher should be made as serious an offense as the sending of a false alarm would be. Policemen would be instructed to examine each extinguisher box during their tours of duty, and to facilitate this inspection a small opening in the front of the box, covered with glass, would keep the extinguisher in view at all times. The care and maintenance of extinguishers would be left to the fire companies in whose districts they are placed, and before leaving any fire, it should be incumbent upon the commanding officer having jurisdiction over the extinguisher used at a fire, to have it properly charged and replaced in its position in the box. To prevent freezing in cold weather a pound of chloride of calcium could be mixed with the solution in each extinguisher. And, finally, instructions in the use of the extinguisher could be painted in white on both sides of the box door.

The need for just such "first aid" as an extinguisher would render was forcibly impressed on the writer's mind recently when a huge motor van filled with furniture took fire while passing through an outlying section of New York city. The chauffeur immediately attacked the blaze with a Pyrene extinguisher, while his assistant ran to an alarm box three blocks distant. The small extinguisher held the fire to its point of origin for possibly a minute, but as soon as its contents was exhausted the flames spread to the body of the van, and on the arrival of the first engine company two minutes later, the load of furniture was beyond saving. Had a 3-gallon extin-

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guisher been available to the man who sent in the alarm, it is highly probable that it would have continued to hold the fire in check until the arrival of the engine. The initial cost of the extinguishers would be the greatest expense connected with the adoption of the foregoing suggestion, but once installed they would last indefinitely, and would prove a potent factor in reducing the annual loss by fire.

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No. 68 FIRES ORIGINATING IN TENEMENT AND APARTMENT HOUSES.—Nearly every day we read in the daily papers how fire has destroyed some large plant or business industry, throwing thousands out of employment and destroying property and valuable stock; but little or no attention seems to be paid by the general public to the large number of fires occurring in tenement and apartment houses.

The only method that seems open to reduce these fires is by educating the people to realize the fatal consequences which often follow. A fire starting at night in the cellar or the lower story of a dwelling, is usually extinguished without loss of life and with only slight damage to property; but with defective floors, hollow spaces inside walls affording drafts and flues, modern dwelling houses are actually constructed on the principle of lungs for breathing flame. I believe that every city department, which has inspectors constantly coming in touch with the people, should call attention of the owner and householder to the defects mentioned above, as well as to the large number of fires caused by carelessness.

A person should fear fire in his home more than he does in his office or his place of employment, for two reasons: (1) because all he holds most precious is in his home—a fire means danger to his family and homelessness until a new place can be found; (2) his responsibility for the safety of his home is undivided. He alone is responsible for the preservation of his home. He cannot feel that some one else should take care of these things. The home is the unit of social life; its destruction has a more far reaching influence than the mere loss of furniture. A man really owes it to society, as well as to his family, to see that no precautions are omitted in the protection of his home against fire.

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No. 69 FIRES ON ELEVATED RAILROAD STRUCTURES — THEIR CAUSES AND PREVENTION.—Fires occurring on elevated railroad structures and platforms are frequent and, though at times small, if not properly checked may gain considerable headway and result in accident. Fuel for such fires is plentiful, the stations and railroad ties being constructed of wood; but of late progress in line with fire prevention and engineering has caused railroad companies to construct stations of concrete and steel. Steel ties are susceptible to atmospheric conditions and consequently rust, and the use of same would require constant attention, hence wooden ties must still be resorted to.

Among these wooden ties and footpaths the greater percentage of fires occur. Newspapers, cigarette boxes, etc., are thrown from stations and trains, and particles of dust find lodgment between the ties and on the footpaths. Grease and oils from the trucks of the trains also tend to feed flames. Sparks from third rails, sun rays, but principally, lighted cigarettes and sparks thrown from pipes are the chief causes of fires on elevated railroad structures. In New York we have a law forbidding smoking on stations and platforms of trains—but why not make it a stringent law? It is a common sight to see men smoking on elevated structures and on trains, and as we have a law why not have the railroad people aid in enforcing it? Such persons are responsible for awning fires as well. Some one carelessly throws a lighted cigarette or empties a pipe from a moving train, regardless of where the sparks fall, and within ten minutes after, the proprietor or tenant becomes aware that his awning is ablaze, or some one turns in an alarm for a fire on the elevated structure. The cigarette or spark has found lodgment in a newspaper, or settled on a

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dusty oil-soaked railroad tie, or footpath. If the watchword of today is "Fire Prevention," why not make this one of our aims and see that smoking is restricted on the stations and on the platforms of trains? Go a step farther and prohibit people from throwing newspapers (which are inflammable) and cigarette boxes from trains, amongst which sparks may settle?

After a fire occurs on the elevated structure, its extinguishment follows. Why not instruct the railroad guards how to cope with such fires, and when the motorman sees one let him understand that he must stop and have the guards extinguish it? That would require only a few minutes, and it might save a serious accident, especially in the night when it has gained headway, or the ties have been burned in the vicinity where the tracks are connected by fish plates. Pressure brought to bear on this part of the track, and nothing to resist it, will naturally throw the track out of alignment or disrupt it. Furthermore, prompt action may be the means of saving telephone or telegraph wires which run along such structures, from being burned. Another plan would be to have a small electric car similar to a hand-car, equipped with buckets of sand, Pyrene extinguisher, an axe, hook, and 2½-gallon extinguishers in readiness at a depot to which place the station operator, upon being notified by a civilian, could telephone. The men available for such service could be those regularly employed at night and day at the depot, and who could be spared in case of emergency. Such men could be taught the use of auxiliary fire appliances, which would be advantageous should a fire occur at the depot. Placards, soliciting the help of patrons could be posted in the trains and on stations, advising them to notify the station agent whenever a fire is discovered on the elevated structure. He could then call this "Flying Squadron."

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No. 70 FIRES CAUSED BY LIGHTNING —BEST METHOD OF PROTECTING FARM PROPERTY.—Prevention of farm fires has received comparatively little attention in this country. We have been too busy attempting to solve the problems that crowded on us in the great centers of population. In some States the loss in the rural districts is one-fourth of the total fire loss. Much of this loss in the country is caused by lightning.

Those who give serious attention to fire prevention have made light of the services of the lightning rod, and until very recently the lightning rod companies and the lightning rod salesmen have been dependent on their own resources to set forth the value of their product. As their evidence was, of course, *ex parte*, it lost much of its weight. It is gratifying to see officers charged with fire prevention duties and scientists of recognized ability devoting attention to the lightning hazard and the methods of preventing the lightning loss.

The most reliable records available show that lightning causes 7 per cent to 10 per cent of the total fire loss, and 20 per cent or 25 per cent of the farm losses. In years when thunderstorms have been especially frequent and severe the percentage of farm loss caused by lightning has often been more than 50 per cent. Effective methods of preventing this loss are certainly worth consideration. Two methods of protecting buildings from lightning are in use. Both are based on the same principle. One is to equip buildings with rods, the other to extend ground connection to metal roofs. Both of these methods are considered good.

The evidence in favor of the use of the lightning rod is fast accumulating. The records of the State fire marshals add emphasis each year to the favorable record of the preceding year. Careful examination of buildings equipped with rods which are struck by lightning, shows that the protective system was not properly grounded, or was otherwise defective. The farmers mutuals have also kept careful records and have unqualifiedly endorsed the rods.

The American government, through several departments, has investigated the use of the lightning rod and has always approved its use. The Navy Department and the Department of Agriculture

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have both made such investigations. A better evidence of the belief of the government experts in the efficiency of the rods is their use on the White House and on other public buildings and the Washington monument. The German government, through its officials, examines all lightning rods each spring and those which are defective are repaired. Germany is the foremost nation in the world in its government efficiency and in methods of property conservation.

During the last year two important and careful investigations into the value of the lightning rod have been made by non-partisan investigators. One of the examiners was W. H. Day, a professor of physics in the Ontario Agricultural College, the other being Prof. W. H. Smith, of the United States weather bureau. Their conclusion is the same, that lightning rods are from 90 per cent. to 99 per cent. efficient. Where the mutual fire insurance companies carefully and frequently examine the rods, the efficiency rises to 98 per cent. and 99 per cent.

The farmers' mutual fire insurance companies are showing their belief in lightning rods by more than recommendations. They are granting discriminative rates in favor of buildings equipped with rods. This is especially true of the companies in those States in the old Northwest Territory. Even the stock companies are beginning to give serious consideration to the value of the lightning rod, as it affects their losses on farm property, and some of the important insurance journals which circulate in the offices of these companies, are advising that the stock companies follow the lead of the mutuals in this matter.

The National Board of Underwriters has rules establishing a standard for placing the rods. These rules are prepared and distributed by the National Fire Protection Association. The underwriters' laboratories have recently endorsed the lightning rod by the attachment of their label to lightning rod systems.

For protection against lightning there is no better insurance than the properly-placed lightning rod. No payment of insurance after a loss will recompense the honest man for his actual value loss and inconvenience. Every fire prevention enthusiast and officer interested in farm losses should enter the campaign to break down the prejudice which has gathered about the lightning rod. Much of this prejudice has been brought on by the lightning rod companies themselves, who have charged exorbitantly for their goods and services, but at the present day their charges are usually within reason and the service rendered is good.

PRIZES FOR JULY ARTICLES.

First Prize. No. 63. Thomas J. Lucas, Fireman, First Grade, Hook & Ladder Company No. 115, New York Fire Department, Long Island City, N. Y.

Second Prize. A tie. Nos. 62 and 64. Harriet Henderson, Manton, Mich. Earl W. Thomas, Secretary, Missouri Fire Prevention Association, St. Louis, Mo.

Another meritorious article was contributed by Ralph E. Richman, Deputy State Fire Marshal, Indianapolis, Ind.

COMMENTS BY MEMBERS OF THE COMMITTEE

I vote for No. 64 for first prize. The writer covers the subject of fire prevention quite thoroughly. A large percentage of the residence fires are reported as "cause unknown," but really are due to carelessness and ignorance. If the schools taught fire prevention as one of the studies, and gave a rating on the subject the same as arithmetic, etc., fire prevention would be known throughout the country thoroughly after a generation or two. The parents would become interested, and the children, after becoming men and women, could teach their children in reference to their own homes, the dangers from matches,

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gasoline, kerosene, stoves, furnaces, electric wires, gas brackets, rubbish and ashes. Fires would then be reduced. Homes would be safer and there would be less reason for the fire-fighter to ascertain the cause of the fire. Parents and children could readily see the danger of the various home hazards, if they were properly instructed.

No. 63 is my choice as winner, because the author of this article covers what is known as a partner to firemen in putting out fires before the fire department gets there, which means the saving of many dollars in loss as has been shown in the past. All the large buildings of manufacturing and construction where sprinklers are needed are fast taking advantage of their efficiency and installing them. This article instructs in the following ways: Their advantage, if properly installed, to be located to cover all parts of premises, to be sensitive to location and occupancy, proper size piping and pressure, proper check and shut off valve, an alarm system to notify the fire department. Located in all parts where fires may occur, sprinklers will protect even the most remote places in buildings and other places where fires may start.

No. 63, in my opinion, is the best article. The writer explains the proper method of installing the automatic sprinkler and also its advantages as a fire extinguisher.

I vote for No. 62. In my opinion the article is very good. Although education is still in its infancy it makes one think of the hazards of the past and present.

Fire prevention walks hand in hand with "Safety First." We must not be careless in handling fire and we should let "Cleanliness" be our motto. In Germany they do not consider a fire in the home merely a misfortune, but a disgrace. No. 64 gives an outline which should, if properly taught the different aged children, give wonderful results later on.

No. 65 receives my vote for the reason that the suggestions are sound and practical. To all appearances fire prevention education will be slow; therefore I believe in doing the best we can with the adults, and starting the proper training with the young.

I cast my vote for 64 because it suggests perhaps the most practicable method of inculcating fire prevention ideas in the minds of the rising generation. The school atmosphere can readily be made sympathetic with the new thought, and this can seldom be said of the home, for always there is some older person present who remarks "Oh, pshaw, you are an awful fuss!"—a remark naturally calculated to destroy at once all serious acceptance of fire prevention ideas.

In my opinion, 62—"Efficiency in Education for Fire Prevention"—should receive consideration as the best article in "The Fight Against Fire" contest in the July issue of SAFETY ENGINEERING, for the reason that it goes into the scientific way of treating this matter, and provides the method for handling the same.

No. 62 is my choice for first prize because it is a little nearer to attacking causes, "prevention is better than cure." It is a close call all around, however, as all of the articles are excellent.

Accept my vote for article 63, for the reason that that author explains in detail the places requiring sprinklers, the necessity thereof, the value to buildings for the installation of same. The writer shows that he possesses a wide knowledge of fire protection and prevention, and covers almost every phase appertaining to the necessity of same.

I think that No. 63 should be awarded

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CONDITIONS OF COMPETITION.

To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.

The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.

Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.

In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.

Articles will be received from any person competent to discuss the question of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. Articles should not exceed the limit of 800 words. No consideration of any kind is required for the privilege of competing.

Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.

Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.

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first prize. While many of us know in a general way the advantages of automatic sprinklers, there still remains a great need for education concerning this form of protection. The writer of No. 63 has evidently given the subject he essays to discuss considerable study and he presents his ideas in such a way as to make the article well worth while.

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No. 64 is my choice for first prize for the following reasons: That I think there cannot be too much education along the line of fire prevention, that I am a firm believer in the efficiency of the lecture system as a means of spreading the fire prevention propaganda, that the common hazards are covered in detail, that the suggestions are simple and practicable, and finally, because I thoroughly agree with the author that no opportunity to preach fire prevention should be overlooked.

QUARANTINE RECKLESS BOSSES.

Why not quarantine the careless, thoughtless and reckless bosses and men who are the makers of cripples, widows and orphans, the same as we do with diphtheria, scarlet fever and smallpox patients? the National Safety Council asks. The former are the more dangerous.

FIREMEN'S CONVENTION.

The forty-third annual convention of the International Association of Fire Engineers is to be held in Cincinnati, on August 31 and September 1, 2 and 3, inclusive, 1915. The officers of the organization are: president, Hugo R. Delfs, Lansing, Mich.; first vice president, H. L. Marston, Brockton, Mass.; second vice president, Thomas A. Clancy, Milwaukee, Wis.; secretary, James McFall, Roanoke, Va.; treasurer, George Knofflock, Mansfield, O. Aside from the papers to be presented on different topics, the most interesting part of the proceedings is to be the testing of the various makes of fire engines. The rules governing these tests are as follows:

Exhibitors will be required to state in advance the rating they place on their pumping engines, that is, gallons discharged at 120 pounds net pressure, at 200 pounds net pressure, and at 250 pounds net pressure. Provision will be made for exhibitors to run a preliminary test.

The preliminary test is expected to be sufficiently exhaustive to determine how much water each engine can deliver at the various pressures above specified, but it is to be definitely understood that this delivery shall be no more than can be maintained for the full period of the final test. An engine able to deliver, for example, 740 gallons at 120 pounds net pressure will be given a corresponding lay-out of hose and nozzles.

Ratings of engines will be considered as the next lower even 50 gallons than the quantity delivered at the preliminary test; for ex-

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ample, an engine delivering 740 gallons at 120 pounds net pressure will be rated at 700 gallons, and an engine delivering 880 gallons will be rated at 850 gallons. Any engine rated less than 700 gallons will be permitted to use a suction not more than 4½ inches inside diameter; any engine rated at 700 to 850 gallons will be permitted to use a 5-inch suction; any engine rated at 900 gallons or more will be permitted to use a 6-inch suction.

The committee reserves the right, after the completion of the tests, to place any engine in another class than the one in which it is entered.

The tests will continue for a duration of 12 hours, divided as follows:

6 hours delivering at 120 pounds net pressure the quantity determined by the preliminary test.

3 hours delivering at 200 pounds net pressure the quantity determined by the preliminary test.

3 hours delivering at 250 pounds net pressure the quantity determined by the preliminary test.

Note.—If any engine is unable to maintain the net pressure noted above, the maximum obtainable pressure will be substituted.

During any of the runs not more than two men at one time will be allowed to operate or care for the engine.

Exhibitors will be required to furnish in advance a chart showing the measured brake horse power developed by their engines at rates of speed within the range likely to be reached during the tests.

Provisions must be made by the exhibitor on each machine for an exposed shaft end, either on the motor or the pump so that a hand revolution counter may be used to determine speed.

The exhibitor must give exact dimensions of engine cylinders and length of stroke; from these the piston displacement in cubic inches per minute will be figured, and comparisons will be made between the piston displacement, the brake horse power of the engine and the power developed by the pump.

Provision must be made for attaching the test gage to a connection at some convenient point on the discharge piping; test gages have ¼-inch pipe thread.

The wharf on which engines will be tested is about 3 feet above water level.

Gasoline of the same grade will be supplied for the use of all engines. Exhibitors may use any grade of lubricating oil desired.

Records will be kept of the amount of each that is used.

Papers on the following topics will be read and discussed at the business sessions of the association:

"Would the Compulsory Sprinkling of All Business Buildings and Blocks in the Congested Districts of a City Eliminate a Possible Conflagration in These Districts"—W. H. Murphy, Chief, Philadelphia, Pa.; C. E. Swingley, Director of Public Safety, St. Louis, Mo.; John Grady, Fire Commissioner, Boston, Mass.

"The Manufacture, Selection, and Care of Rubber Tires for Fire Apparatus"—A. H. Leavitt, of B. F. Goodrich Co., Akron, Ohio.

"The Progress of Fire Prevention; (a) The Work of the National Fire Protection Association"—Franklin H. Wentworth, Secretary N. F. P. A., Boston; (b) "Fire Department Work in Fire Prevention"—J. C. McDonnell, Chief Bureau of Fire Prevention and Public Safety, Chicago.

"Proper Restrictions for Storage and Handling of Nitric Acid"—Thos. A. Clancy, Chief, Milwaukee, Wis.; John F. Healy, Chief, Denver, Colo.

"Traction and Non-Skid Devices for Motor Driven Fire Apparatus"—James Smart, Chief, Calgary, Alta.; O. Johnson, Chief, Superior, Wis.

"Fire Department Organization in Industrial Plants"—Philip S. Tilden, Chief Division of Fire, Harrison Bros. & Co., Philadelphia, Pa.; N. V. Holmes, Fire Marshal, Sears-Roebuck Co., Chicago, Ill.

"What Progress Has Been Made in Electric Fire Alarm Systems"—W. H. Flandreau, Superintendent Fire Alarm, Mt. Vernon, N. Y.

"Uniform Fire Proofing of Theatrical Scenery"—H. C. Bunker, Chief, Cincinnati, Ohio.

LABOR BENEFITS IN CANADA.

The fourth annual report on labor organization in Canada, embodying statistics, etc., for the calendar year 1914, has been issued by the Department of Labor. A table shows the expenditures during the year 1914 on account of benefits paid by central labor organizations operating in Canada. The total disbursements during 1914 by the various international organizations amounted to $12,837,987, among them the following:

Death benefits.....	$8,864,631
Sick benefits.....	963,353
Accident benefits...	635,580
Old age pensions....	266,395

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SAFETY EXHIBITS AT THE PANAMA-PACIFIC EXPOSITION

A DIRECTORY of the safety exhibits at the Panama-Pacific Exposition is published below. It was prepared by the Collective Insurance and Universal Safety Exhibit for publication in SAFETY ENGINEERING and the daily edition of *The Insurance Field*, the collective exhibit being conducted jointly by *The Insurance Field* and SAFETY ENGINEERING. In addition to the displays in the collective exhibit, safety devices form a part of the exhibits by the United States Government and by various industrial and insurance corporations. A classification of the safety and welfare exhibits shows the following:

Rescue or Life Saving Demonstrations	4
Industrial Corporations, showing Prevention Work	6
Government Exhibits, Safety and Welfare	13
Health Boards and Prevention of Disease	9
Societies for Promotion of Health and Welfare	19
Manufacturers and Exhibitors of Safety Devices	158
Total	209

The booths showing how accidents and fires may be prevented are thronged every day. Interested visitors have not only seen the work for themselves, but have sent their friends to see it.

SAFETY EXHIBITS AT SAN FRANCISCO.

SAFETY PRESS, INC. (THE), New York, managers, accident and fire prevention department, Collective Insurance & Universal Safety Exhibit, Avenue C and Second Street, Palace of Mines—Literature of safety methods; file of "Safety Engineering"; book publications as follows: "Universal Safety Standards," "Notes on Hydraulics," "Safety," "Fires and Fire Fighters," "Occupational Diseases," "Automatic Sprinkler Protection."

ACKRODY & BEST, LTD., Pittsburgh, Pa., United States Government Exhibit, "The Mine," Palace of Mines—Safety oil lamps.

AERO AUTO FIRE ALARM COMPANY, Seattle, Wash., Avenue C and Tenth street, Palace of Liberal Arts—Auxiliary fire alarm service for Panama-Pacific International Exposition—Working exhibit.

ALLEN MANUFACTURING COMPANY, Hartford, Conn., Collective Insurance & Universal Safety Exhibt, Avenue C and Second street, Palace of Mines—Safety set screws.

ALSOP PROCESS COMPANY, St. Louis, Mo., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Jointer guard.

AMERICAN ABRASIVE METALS COMPANY, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Feralum safety tread; safety spikes for ladder; safety shoes for ladder. Also exhibit of safety tread in Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines.

AMERICAN HOIST AND DERRICK GRIP, St. Paul, Minn., Fifth street and Avenue G, Palace of Machinery—Crosby safety grip for cables.

AMERICAN-LA FRANCE FIRE ENGINE COMPANY, Elmira, N. Y.—Panama-Pacific International fire department as working exhibit of all fire fighting apparatus, consisting of motor trucks, engines, hose carts and chemicals. May be examined at any of the three fire stations on the Exposition grounds.

AMERICAN MASON SAFETY TREAD COMPANY, Lowell, Mass., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety tread; safety shoes for ladder.

AMERICAN MINE DOOR COMPANY, Canton, Ohio, United States Government Exhibit, "The Mine," Palace of Mines—Automatic mine doors.

AMERICAN PULLEY COMPANY, New York, Fourth street and Avenue I, Palace of Machinery—Metal sash pulleys.

AMERICAN SAFETY HOOK COMPANY, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety hook for chains.

GOLDEN ANDERSON, Pittsburgh, Pa., Fifth street and Avenue D, Palace of Machinery—Automatic steam and water valves.

ANGELL ELEVATOR LOCK COMPANY, Boston, Collective Insurance & Universal Safety Exhiibt, Avenue C and Second street, Palace of Mines—Safety stop for elevator and mine cages.

ASBESTOS PROTECTED METAL COMPANY, Pittsburgh, Pa., United States Government Exhibit, "The Mines," Palace of Mines—Asbestos protected structural steel, walls, floors, roofs and windows and door frames complete for smoke room and radium booths.

E. C. ATKINS & CO., Indianapolis, Ind., Fifth street, between Avenues C and D, Palace of Manufactures—Saw guards. Also exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines.

AUTOMATIC FOLDING FENDER AND CATTLE GUARD, Avenue A, just off Fifth street, Palace of Transportation—Street car fender and cattle guard for railway tracks.

AUTO PEDAL COMPANY, New York, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Non-slip safety tread.

BADGER FIRE EXTINGUISHER COMPANY, Boston — Panama-Pacific International Exposition buildings and exhibits protected by extinguishers. Also fifty-gallon chemical engine at Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines.

BALTIMORE ENAMEL & NOVELTY COMPANY, New York, United States Government Exhibit, "The Mine," Palace of Mines—Safety signs.

BARUCH ELECTRIC CONTROLLER CORPORATION, San Francisco, Cal., First street, between Avenues C and D, Palace of Machinery—Circuit breakers and current controllers.

BAUER & BLACK, Chicago, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—First aid cabinet; family accident case; automobile accident case; first aid packet, Army style; travelers' accident packet No. 2; first aid packet No. 1.

BEACH MANUFACTURING COMPANY, Montrose, Pa., Fifth street and Avenue G, Palace of Machinery—Saws equipped with guards.

E. W. BLISS COMPANY, Brooklyn, N. Y., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Punch press guard.

BOWERS RUBBER WORKS, San Francisco, Eighth street and Avenue C, Palace of Manufactures—Fire protection hose.

S. F. BOWSER & CO., Fort Wayne, Ind., Eighth street and Avenue B, Palace of Transportation—Safety gasoline pumps and systems.

BRISTOL COMPANY (THE), Palace of Manufactures—Safety set screws; also exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines.

BERCHARD COMPANY (THE), Philadelphia, Pa., Sixth Street and Avenue D, exhibited with

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Thomas Devlin & Co., Palace of Manufactures—Non-slip expansion bolts.

BROWNE & SHARP, Providence, R. I., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safeguard for wheelbarrow handles.

BUFFALO WIRE WORKS, Buffalo, N. Y., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Belt guards.

J. H. BURNETT IRON WORKS, Fresno, Cal., First street and Avenue G-2, Collective Exhibit of California Manufacturers, Palace of Machinery—A perfect bolt; cannot accidentally loosen.

BURROUGHS, WELCOME & CO., New York, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—First aid cabinet.

EIMER AND AMEND, New York, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Device attached to carboys eliminating danger to operator from splashing chemicals.

CARLISLE & HAMMOND COMPANY, Cleveland, Ohio, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety type hollow set screws.

CARNEGIE STEEL COMPANY, Pittsburgh, Pa., Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Safety tool heads.

CHICAGO PNEUMATIC TOOL COMPANY, Chicago, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Electric portable drill.

L. CHRISTIANSEN, Lynn, Mass., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Elevator lock.

COAST MANUFACTURING & SUPPLY COMPANY, Livermore, Cal., United States Government Exhibit, "The Mine," Palace of Mines—Safety fuse.

CONCORDIA SAFETY LAMP COMPANY, Pittsburgh, Pa., United States Government Exhibit, "The Mine," Palace of Mines—Electric safety lamps for mines.

CRANE COMPANY, San Francisco, Cal.. Second street and Avenue E, Palace of Machinery—Water and steam valves.

CRESCENT MACHINE TOOL COMPANY, Leetonia, Ohio, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety cylinders for jointers; safety cylinder heads for sharpers.

DAVIS SEWING MACHINE COMPANY, Dayton, Ohio, Sixth street and Avenue E, Palace of Transportation—Motor tricar chemical fire engine; full equipment. Can be demonstrated.

DENNISON BLOCK COMPANY, Sacramento, Cal., Fifth street and Avenue I, Palace of Machinery—Patent building tiling.

DETROIT FUSE & MANUFACTURING COMPANY, Detroit, Mich., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety interlocking electric switch and same with pilot light; safety service switch with lock-open feature, two and three pole; safety knife blade switch with lock-open feature.

DIAMOND CLAMP & FLASK COMPANY, Richmond, Ind., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Belt shifter.

DODGE MANUFACTURING COMPANY, Mishawaka, Ind., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Electrically controlled friction clutch pulley, with emergency button; self-oiling loose pulleys and life shaft hangers.

DRAEGER OXYGEN APPARATUS COMPANY, Pittsburgh, Pa., United States Government Exhibit, "The Mine," Palace of Mines—Artificial breathing appartus and oxygen pump. Also Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines, apparatus complete with oxygen generating system, asbestos suit used in mine rescue work and pulmotor.

E. I. DU PONT DE NEMOURS POWDER COMPANY, Wilmington, Del., Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Oil seal hose box for unlined linen hose and exposed hydrants; plates for insulating and separating steam lines passing through inflammable walls.

ECLIPSE SCAFFOLDING COMPANY, Omaha, Neb., Fifth street and Avenue H, Palace of Machinery—"Little Wonder" safety scaffold.

EDISON ELECTRIC COMPANY, Orange, N. J., United States Government Exhibit, "The Mine," Palace of Mines—Safety electric mine lamp.

CHARLES F. ELMES ENGINEERING WORKS, Chicago, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Jointer guard.

ENSIGN-BICKFORD COMPANY, Simsbury, Conn., United States Government Exhibit. "The Mine," Palace of Mines—Safety fuse.

EYON-EVANS MANUFACTURING COMPANY, Philadelphia, Pa., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Lock-open knife blade switch.

J. A. FAY & EGAN COMPANY, Cincinnati, Ohio, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Boring machines with bit guard; safety cylinders for jointers; band saw, upper and lower wheels guarded, upside of saw guarded, point of operator guarded, belt shifter equipped with brake; sharper guards.

FEDERAL TRUCK COMPANY, Detroit, Mich., Eighth street and Avenue D, Palace of Transportation—Automobile chemical fire truck, fully equipped by Pirsch Manufacturing Company.

G & W ELECTRIC SPECIALTY COMPANY, Chicago, Ill., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety line disconnector.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y., Second street and Avenue C, Palace of Transportation—Electric appliances; air brakes; safety devices. Also safety electric mine lamp, United States Government Exhibit, "The Mine," Palace of Mines. Also punch press guard, safety interlocking electric switch and safety testing plug, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines.

GENERAL FIRE EXTINGUISHER COMPANY, Providence, R. I., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Model factory installed with automatic sprinklers.

GENERAL RAILWAY SIGNAL COMPANY, Rochester, N. Y., Eighth street and Avenue B, Palace of Transportation—Automatic railway block system in operation, displayed in booth of Edison Electric Company.

G. M. GEST, New York, Third street and Avenue D, Palace of Machinery—Models and methods of underground conduits; manhole construction.

GOLD CAR HEATING AND LIGHTING COMPANY, New York, Second street and Avenue C-2, Palace of Machinery—Safety car lighting and heating systems; safety portable heaters.

GOODYEAR TIRE & RUBBER COMPANY, Akron, Ohio, United States Goverment Exhibit, "The Mine," Palace of Mines—Air and water hose.

GORHAM ENGINEERING & FIRE APPARATUS COMPANY, San Francisco, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Pyrene hand fire extinguishers; smoke helmet.

L. F. GRAMMES & SONS, Allentown, Pa., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Sharper guards; saw guards, especially adapted for metal cutting saws.

HAMMACHER, SCHLEMMER & CO., New York, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Hollow set screws.

HARRINGTON & KING PERFORATING COMPANY, Chicago and New York, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Belt guards.

HAUCK MANUFACTURING COMPANY, Brooklyn, N. Y., Fifth street and Avenue G, Palace of Machinery—Safety kerosene torches.

S. F. HAYWARD & CO., New York, United States Government Exhibit, "The Mine," Palace of Mines—Westfalia mine rescue apparatus. Also automatic respirator and smoke protectors, rubber and aluminum and sand-blast helmet, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines.

HEISLER & WITTE, Chicago, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Freight elevator lock for doors.

JOSHUA HENDY IRON WORKS, San Francisco, Cal., United States Government Exhibit, "The Mine," Palace of Mines—Safety mine cage.

HERMAN SAFE COMPANY, San Francisco, Cal., Sixth street, near Avenue C, Palace of Manufactures—Burglar and fireproof vaults.

HESS STEEL CASTINGS COMPANY, Philadel-

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phia, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Safety hopper car wrench.

HICKORY STEEL-GRIP GLOVE COMPANY, Chicago, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Steel grip gloves for workmen.

HIRSCH ELECTRIC MINE LAMP COMPANY, Philadelphia, Pa., United States Government Exhibit, "The Mine," Palace of Mines—Safety electric mine lamp.

HOLT EXPANSION JOINT & ROOF WATER CONNECTION, Lawrence, Mass., north entrance Palace of Varied Industries—Models of roof connection pipes which guarantee against leakage by patent expansion joints. Displayed by Lawrence (Mass.) Chamber of Commerce.

A. F. HOWE, Granite City, Ill., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Jointer guard; saw guard.

HUGHES COMPANY (THE), Scranton, Pa., United States Government Exhibit, "The Mine," Palace of Mines—Safety oil lamps.

HUMASON BROTHERS, Youngstown, Ohio, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Saw guard.

J. A. JACKSON, Oakland, Cal., exhibited through Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Self-feed rig saw guard.

H. W. JOHNS-MANVILLE COMPANY, New York, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Fourdryman's asbestos clothing.

JOHNSON & JOHNSON, New Brunswick, N. J., Palace of Liberal Arts—Display of first aid packages; booklets on first aid. Also first aid package in Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines. Also exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines.

JOYCE-CRIDLAND COMPANY, Dayton, Ohio, Fifth street and Avenue F, Palace of Machinery—Safety jacks.

JULIUS KING OPTICAL COMPANY, Chicago and New York, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety goggles for workmen.

KINGS SUPERIOR AXE COMPANY, Canton, Conn., Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Fire axes.

KING MACHINE TOOL COMPANY, Cincinnati, Ohio, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Cone belt shifter.

KOEHLER MANUFACTURING COMPANY, Marlboro, Mass., United States Government Exhibit, "The Mine," Palace of Mines—Safety lamps for detecting explosive gas.

KRIEPE & REINHARDT, New York, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Punch press guard.

LAGONDA MANUFACTURING COMPANY, Springfield Ohio, Second street and Avenue G-2, Palace of Machinery—Steam valves; double check boiler tube cleaners.

LE BLOND MACHINE TOOL COMPANY, Cincinnati, Ohio, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Cone belt shifter.

LIFE SAVING DEVICE COMPANY, Chicago, Ill., United States Government Exhibit, "The Mine," Palace of Mines—Artificial respiratory apparatus.

LINEMAN PROTECTOR COMPANY, Chicago, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Lineman's protector.

LOCKHART-HODGE COMPANY, Buffalo, N. Y., Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Guards for circular saws, planes and wood shapers. Also saw guards, overhead and bracket support; jointer guards and sharper guards, exhibited by Aetna Life Insurance Company, Avenue C and Second street, Palace of Mines.

LUCKENHEIMER COMPANY (THE), Cincinnati, Avenue G-2 and First street, Palace of Machinery—Valves and engineering appliances.

MANN & WILKOMM, Germany, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Model of elevator with safety stops.

MANNESMANN LIGHT COMPANY, New York, United States Government Exhibit, "The Mine," Palace of Mines—Manlite safety electric mine light.

MATHIAS KLEIN & SONS, Chicago, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Lineman's safety pliers; lineman's safety belt.

W. N. MATTHEWS & BROTHER, St. Louis, Mo., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Matthews' fuse switch.

McNUTT CAN SALES COMPANY, INCORPORATED, New York, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Non-explosive gasoline cans.

MINE SAFETY APPLIANCE COMPANY, Pittsburgh, Pa., United States Government Exhibit, "The Mine," Palace of Mines—Fleuss-Proto artificial breathing apparatus, safety lamp, testing and demonstrating box, recording volumeter, recording hydro air pressure gauge for fan, and first-aid materials for the demonstration.

MOREWOOD STANDARD SAFETY DEVICE COMPANY, New York, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Safety belt for use of window cleaners.

MORRISON SAFETY LADDER-FOOT SUCTION GRIP COMPANY, Lowell, Mass., Palace of Transportation—Safety ladders, with suction grip and shoes for laddermen. Also exhibited by Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, and Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines.

MOSSBERG WRENCH COMPANY, Central Falls, R. I., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Belt shafter.

MUTH METAL SEPARATING SCREEN COMPANY, New York, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Pulmosan respirator.

NATIONAL LAMP WORKS, Cleveland, Ohio, United States Government Exhibit, "The Mine," Palace of Mines—Mine safety lamps.

NATIONAL SIGNAL COMPANY, San Francisco, Cal., Eighth street and Avenue B, Palace of Transportation—Automatic railway crossing signal in operation, displayed in booth of Edison Electric Company.

NATIONAL TUBE COMPANY, Lorain, Ohio, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Safety hooks and bucket hoist; safety hood for feed valves; safety sign "man in boiler."

NELSON VALVE COMPANY, Philadelphia, Second street and Avenue D, Palace of Machinery—Water and steam valves.

NEPTUNE METER COMPANY, New York, First street and Avenue C, Palace of Machinery—Water and fire service meters; trident protection water meter used by Panama-Pacific International Exposition.

NEVER SLIP SAFETY CLAMP COMPANY, New York, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Horizontal and vertical safety clamps for boiler plate. Also exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines.

NEW JERSEY ZINC COMPANY, Palmerton, Pa., Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Safety wrenches for hopper cars; safety shield for spelter ladle; safety ladder and fire escape.

NEW YORK AIR BRAKE COMPANY, Sixth street and Avenue C, Palace of Transportation—Working air brake equipment for twelve-car passenger train.

NEW YORK EDISON COMPANY, New York, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Ground stick to test high tension feeder before joint is opened for repairs; medical cabinet, consisting of oxygen tank, reclining chair, blanket and head rest; first aid kit.

NORTON COMPANY, Worcester, Mass., Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Emery wheel with safety guard.

WILLIAM W. NUGENT & CO., Chicago, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Long spout oil can.

OHIO CHEMICAL & MANUFACTURING COMPANY, Cleveland, Ohio, Tenth street, near Avenue C, Palace of Liberal Arts—Monovalve and anaesthetic apparatus.

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OLIVER MACHINERY COMPANY, Grand Rapids, Mich., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Jointer equipped with safety cylinder head and automatic guard.

OTIS ELEVATOR COMPANY, San Francisco, First street, from Avenue F to Avenue G-2, Palace of Machinery—Elevator equipped with safety device.

PACIFIC FOUNDRY COMPANY, San Francisco, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety tread.

PATENT SCAFFOLDING COMPANY, New York, Fifth street and Avenue I, Palace of Machinery—Display of full-sized patent scaffold ready for use. Endorsed by the Underwriters Laboratory. Model in Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines.

PENNSYLVANIA WIRE GLASS COMPANY, Philadelphia, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Section of wire glass from building of California Electric Works that passed through conflagration of 1906, the glass being the recognized means of saving the property from destruction; samples of wire glass, signs and literature explaining protective features.

PERMUTIT COMPANY (THE), New York, Avenue B-c and Eighth street, Palace of Liberal Arts—Appliances for water filtration systems.

PICKERING GOVERNOR COMPANY, Portland, Conn., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Engine governor with automatic broken belt stop.

PITTSBURGH TANK COMPANY, Fifth street and Avenue D, Palace of Machinery—Patented roof tanks.

PYRENE MANUFACTURING COMPANY, New York, Palace of Machinery—Construction and use of the Pyrene fire extinguisher. Demonstrations given. Also hand extinguishers on display in the booth of the Collective Insurance & Universal Safety Exhibit, Second street and Avenue C, also United States Government Exhibit, "The Mine," Palace of Mines.

RAILWAYS SPECIALTIES COMPANY, Los Angeles, Cal., Eighth street and Avenue B, Palace of Transportation—Automatic railway crossing signals in operation, displayed in booth of Edison Electric Company.

RANDALL ELEVATOR CONTROL, San Francisco, Third street and Avenue C, Palace of Machinery—Elevator safety device preventing movement of cage until door is securely closed.

P. L. RIDER, Worcester, Mass., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Barnum respirator.

RIVERSIDE PORTLAND CEMENT COMPANY, Los Angeles, Cal., United States Government Exhibit, "The Mine," Palace of Mines—Cement for concrete floor and walls.

ROBBINS & MYERS COMPANY, Springfield, Ohio, Second street and Avenue C-2, Palace of Machinery—Safety railway signals; ventilators.

SAFETY POWER TRANSMISSION COMPANY, Brooklyn, N. Y., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Shafting guard.

SAFETY CAR HEATING & LIGHTING COMPANY, New York, First street and Avenue D, Palace of Machinery—Models of appliances.

EDWARD SCHENK, Cincinnati, Ohio, United States Government Exhibit, "The Mine," Palace of Mines—Safety oil lamps.

SCHWEITZER & CONRAD, Chicago, Ill., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—High voltage detector; high voltage fuse tongs.

C. SEAMANS SEWING MACHINE GUARD COMPANY, New York, exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Guards for sewing machines.

SIEBER SPRAYING NOZZLE COMPANY, Kansas City, Mo., Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Chemical spraying nozzle with acid proof tank.

SENECA FALLS MANUFACTURING COMPANY, Seneca Falls, N. Y., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Cone belt shifter.

JOHN SIMMONS COMPANY, New York, United States Government Exhibit, "The Mine," Palace of Mines—Carbide hand and cap lamps.

A. P. SMITH MANUFACTURING COMPANY, East Orange, N. J., Second street and Avenue G-2, Palace of Machinery—Valves; waterworks; testing materials.

STANDARD PRESSED STEEL MANUFACTURING COMPANY, Philadelphia, Pa., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety type hollow set screws.

STANDARD UNDERGROUND CABLE COMPANY, Pittsburgh, Pa., Third street and Avenue D, Palace of Machinery—Underground cables and conduits.

STAR ELECTRIC COMPANY, Newark, N. J., Avenue C and Tenth street, Palace of Liberal Arts—Central fire alarm station for the Panama-Pacific International Exposition; working exhibit of fire alarms; boxes, etc.

SURETY GUARD COMPANY, Chicago, Ill., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines— M C K interlocking device for elevator gates; lock for operating cable on elevators; saw guards, overhead support; joiner guard.

TALLEY METER COMPANY, Norwich, Conn., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Sharper guard.

TECHNICAL PUBLISHING COMPANY, New York, First street and Avenue E, Palace of Machinery—High tension wiring showing progress by comparison of 20, 15 and 10 years ago and today.

TEMPLETON-KENLEY COMPANY, Chicago, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Safety jack.

UNION SWITCH & SIGNAL COMPANY, Swissvale, Pa., Eighth street and Avenue B, Palace of Transportation—Automatic railway block signal in operation, displayed in booth of Edison Electric Company.

UNITED SAFETY APPLIANCE COMPANY, Syracuse, N. Y., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Automatic fire escape.

WEST DISINFECTING COMPANY, New York, Avenue C, between Ninth and Tenth streets, Palace of Liberal Arts—Disinfectants; model of indoor sanitary closet for district having no sewer connections; all public accommodations on Exposition grounds are supplied with West disinfectants.

WESTERN ELECTRIC COMPANY, Chicago, Eighth street and Avenue C, Palace of Manufactures—Fire alarm apparatus; gongs; motors. Also portable mine rescue telephone, United States Government Exhibit, "The Mine," Palace of Mines.

WESTERN TRANSFORMER COMPANY, Oakland, Cal., Second street and Avenue C, Palace of Machinery—High Voltage transformers and Bowie lightning arrester.

WESTINGHOUSE ELECTRIC COMPANY, Pittsburgh, Pa., Second to Fourth streets, Palace of Machinery—Safety air brakes; protected motors and dynamos. Also oil circuit breaker to handle 165,000 volts in Palace of Transportation.

WHITE COMPANY (THE), Cleveland, Ohio, United States Government Exhibit, "The Mine," Palace of Mines—Mine rescue motor car, fully equipped for rescue and first aid work. Test run for demonstration from Fillmore street entrance of Exposition to Mines Building, every afternoon, except Sunday, at 2 p. m.

J. H. WILLIAMS COMPANY, Brooklyn, N. Y., Second street and Avenue E, Palace of Machinery—Vulcan safety dogs and wrenches.

GEORGE J. WILLET, Milwaukee, Wis., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Belt-shift locking device. Also safety device for sledge hammers.

T. A. WILLSON & CO., INC., Reading, Pa., exhibited by Aetna Life Insurance Company, Avenue D and Second street, Palace of Mines—Safety goggles for workmen.

WILSON SAFETY GLASS COMPANY, New York, Collective Insurance & Universal Safety Exhibit, Avenue C and Second street, Palace of Mines—Box of safety glasses to protect eyes of workmen.

WITHERBEE IGNITER COMPANY, Springfield, Ohio, United States Government Exhibit, "The Mine," Palace of Mines Electric safety mine lamp.

R. D. WOOD & CO., Philadelphia, Pa., Third street and Avenue I, Palace of Machinery—Valves and hydrants.

YORK SAFE & LOCK COMPANY, York, Pa., First street and Avenue F, Palace of Machinery—Fire and burglar proof boxes and safes.

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BOOKS.

AN EXPLANATION OF THE INDIANA COMPENSATION STATUTE FROM THE STANDPOINT OF THE EMPLOYER. By T. N. Bartlett, H. B. Stone, M.D., A. J. Lilly and Holger Jensen. Published by the Maryland Casualty Company, Baltimore, Md.

A booklet of 47 pages which outlines three things that should be done when accidents happen, namely: (1) Fulfill the requirements of the law and co-operate with your insurance carrier; (2) See to the welfare of the injured by calling a doctor or sending the patient to the hospital, making him as comfortable as possible in the meantime by administering such first aid remedies as may prevent serious complications in the future; (3) Study the cause of the accident and if possible correct it. The booklet shows the importance and economic value of safety organization and outlines a brief but efficient plan therefor. The value of casualty inspections from accident prevention and premium reduction standpoints is also discussed. Two illustrations show the serious results of neglect in attending to injuries.

PROCEEDINGS OF THE NATIONAL FIRE PROTECTION ASSOCIATION. 1915.

The report of the proceedings of the National Fire Protection Association's nineteenth annual meeting held in New York, May 11-13, 1915, fills 500 pages, and the promptness with which it was placed in the hands of members reflects credit upon Secretary Franklin H. Wentworth and all others who participated in its literary and mechanical production. The report shows that, despite the unfavorable commercial and industrial conditions, the organization has not only held its own, but has made substantial gains. The membership is 126 active, 2,595 associate and 4 honorary, making a total of 2,725, a gain of 90 during the year. Among the publications issued and circulated last year by the association aside from its regular "Quarterly," were "Field Practice," an inspection manual, of which 3,000 copies were sold; July and Christmas bulletins, of which 25,000 of the former and 13,000 of the latter were circulated; also several pamphlets, illustrating and commenting on conflagrations. The constant demand upon the association for speakers on fire prevention is nation-wide.

FIRE PREVENTION LESSONS FOR USE IN THE SCHOOLS OF NEW YORK CITY. Published by the Fire Prevention Bureau, New York Fire Department.

This is a pamphlet of 30 pages, with illustrations, prepared under the direction of Fire Commissioner Robert Adamson, for distribution in the schools of New York. The instructions are in the form of questions and answers, and the subjects are: Fires—General Statement; Matches; Cellars; Kerosene Oil Lamps; Fires in Stoves; Gas Stoves, Gas Leaks, etc.; Gas Irons, Ironing Boards, Flimsy Cloth, etc.; Greasy Rags and Spontaneous Combustion; Naphtha, Gasoline, etc.; Christmas Tree and Fourth of July Fires; Fire Prevention in Factories and Homes; How to Prevent Fires in Homes; Some Don'ts for Fire Prevention; What to Do in Case of Fire; How to Send in a Fire Alarm.

INDUSTRIAL DIRECTORY OF NEW YORK. 1913. New York State Department of Labor.

The second annual directory of factory industries in New York, prepared by the Bureau of Statistics and Information of the Department of Labor, is a book of 787 pages. The first division contains statistics of factories and factory employes, distributed geographically. The second division contains a register of factories by firm names. The data were secured from the larger factories by mail or by agents and from the smaller establishments by factory inspectors. More than 10,000 special returns were received, covering more than 75 per cent of the factory employes in the State. The grand total of the statistics is for 51,118 factories, with 1,364,070 employes, of which 88,022 comprise the office force and 1,276,048 the shop force.

The tendency of adequate lighting to reduce accidents in work shops and factories has been repeatedly demonstrated by statistics, and has been much appreciated by every shop manager who has made a change from inadequate illumination conditions to one where lighting is fairly effective. It has also been shown that accidents are more numerous in the winter months when the hours of labor overlap the hours of darkness. If proper artificial illumination were provided this would not be the case.—*Electrical Review.*

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

NEW SPEED TRANSFORMER.

The engineering and manufacturing interests have long felt the need of a high-speed transformer that would take the place of the dangerous, noisy, inefficient methods of transmitting power by means of chains, belts or common gearing.

The Turbo-Gear, or, as it has been termed so aptly, "speed transformer," because it is so unlike gearing, even the highest grade, and an illustration of which is shown, not only enables a slow speed to be secured from high-speed electric motors, but the obtaining of the right speed without the use of sprockets and chains, pulleys and belts, extra shafting and bearings, etc., all of which must be enclosed by guards to prevent accidents.

Steam turbines, to be economical, must necessarily run at high speed, yet many machines, which would lend themselves admirably to this type of prime mover, require a much slower speed. The Turbo-Gear makes it possible to operate the two machines at their most economical speeds, resulting in the highest over-all efficiency.

This "speed transformer" is equally efficient when, as it is sometimes necessary, speed must be increased where steam, gas or oil engines are used for driving high-speed machines, such as centrifugal pumps, blowers, etc.

Turbo-Gears are manufactured by the Turbo-Gear Company, Industrial Building, Baltimore, Md. Further information concerning these speed transformers, the installation of which, it is claimed, means greater safety and economy and higher over-all efficiency, can be obtained by addressing the company and asking for its new illustrated catalogue.

AMERICAN-LAFRANCE MOTOR PUMPING ENGINE TESTS.

The American-LaFrance type of 12-motor pumping engine purchased recently by the city of Fort Myers, Fla., from the American-LaFrance Fire Engine Company, Elmira, N. Y., which had a thorough test, covering all contract requirements, not only came up to the requirements of the contract, but in every test exceeded the stipulations. The demonstration was conducted in the presence of a number of the members of the city council and witnessed by a large assemblage of interested spectators.

The first test, known as the "capacity" test, was conducted on Ireland's dock, two 50-foot lines being laid, carrying 1⅝-inch and 1⅛-inch nozzles, respectively, water being secured through a suction line from the river. The powerful engine, despite a 12-foot lift, delivered a discharge from the two lines of 850 gallons per minute at a pump pressure of 122 pounds net, exceeding the Underwriters' requirements in both pressure and discharge by approximately 15 per cent. Following the test on the dock, the machine was attached to a hydrant and a display demonstration of the range of the various streams was made. Two lines of hose were first laid under 1-inch nozzles, following which one line was operated under a 1½-inch nozzle, the engine throwing from the line 700 gallons of water per minute a distance of 210 feet. H. A. Laycock, chief of the fire department, and H. E. Hoitman and W. C. Biglow, members of the council, accompanied Mr. Devon on a run through the outskirts of the city, where several of the heaviest sandbeds available were traversed with ease, the machine being operated through the most difficult spots with the use of no other than "high" and "intermediate" gear. On the return, a speed test was made, 40 miles an hour being registered.

GIVE THOUGHTLESSNESS A LIFE SENTENCE.

In a little folder devoted to the Detroit ironclad fused switch, attention is directed to the factor of thoughtlessness in accidents of all kinds, and the statement is made that "thoughtlessness governs the figures of actuaries' tables and decides fire and accident rates."

The Detroit ironclad fused switch has been called "the master earner of the plant" because it keeps all other earning assets

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working. The little folder enumerates in a brief manner the distinct points of advantage embodied in the switch, which has been called as great an advance in the matter of control as electricity was over hand power.

This folder and others entitled "Search Warrants Not Needed in the Fuse Circuit-Court," and "Handcuff the Juice and Keep Death Away" will be sent free on request by the Detroit Fuse & Manufacturing Company, 1410 Rivard street, Detroit, Mich.

JUSTRITE SAFETY PRODUCTS.

The merits of the Justrite Fire Extinguisher and fire prevention devices, approved and tested by the Underwriters' Laboratories, Inc., under direction of the National Board of Fire Underwriters, are set forth in a booklet recently issued by the Justrite Manufacturing Company, Chicago.

The Justrite fire extinguisher, one-quart size, is operated by means of a small crank located at the discharging head in a clockwise direction. This crank, controlled by a pawl and ratchet, is attached to a shaft having a worm which meshes into a worm geared drum, around which a cable is wound. The cable draws forward a metal plunger, into which is set a specially heated leather cup forming a perfectly tight cylinder. Sufficient pressure is developed by the worm gear action when the crank is turned at full speed to discharge the fluid in a strong steady stream a distance of 25 to 30 feet.

The Justrite extinguisher is purely mechanical and all interior parts are guaranteed noncorroding if Justrite Fluid only is used. The indicator shows the fluid contents enabling the machine to be kept full and at its maximum efficiency.

The Justrite Automatic Oily Waste Can, for use wherever machinery is used, is an efficient and safe means of preventing oily waste from becoming a fire hazard. By pressing the handle with the foot the cover is raised and closed automatically. Both hands are free. This is a distinct improvement over the old style waste can, which necessitates the cover being manipulated by the hand.

The Justrite Safety Can meets the requirements for using and storing explosive or inflammable liquids, including gasolene, benzine, kerosene, turpentine, naphtha, alcohol, and all other volatile liquids.

NOVEL EXHIBIT AT THE FAIR.

The first motion picture machine designed by Nicholas Power, which saw long actual service in several New York theaters, arrived at the Panama-Pacific International Exposition on July 3 and was set up in the Power's booth in the Liberal Arts Building.

Mr R. W. Horn, the Nicholas Power representative at the exposition, received instructions from the home office to guard this machine very carefully as it is practically priceless; and to further its safe arrival it was sent by the Wells-Fargo Express Company's "valuable wagon."

The machine had not been in operation for some time, having been kept in a glass case in Mr. Power's private office in the New York headquarters of the Nicholas Power Company, but when Mr. Horn oiled it up and started it operating, it attracted considerable attention from many exhibitors as well as from thousands of sightseers.

There is considerable difference between the Power first model and the present "6-A" machine. The early model weighed but 9 pounds, while the "6-A" machine weighs 250 pounds. On the first model the film is placed at the top and tied with a string, there being no film magazine; the rewinding is done in the machine after the film has gone through. There is no automatic shutter, no lower magazine, the film being run into a burlap bag. When the picture is finished, the end is found and the film rewound on the machine.

This machine has been placed in the Power booth at the Auditorium where it will remain during the motion picture conventions, after which it will be returned to the Power booth in the Liberal Arts Building.

STREET CLEANING AT MINIMUM EXPENSE.

After some three years experience and perfecting, the Elgin Street Sweeper Company, Elgin, Ill., has placed on the market the Elgin Motor Sweeper. This sweeper employs the "broom-and-pick-up" method of cleaning city streets, dampening the sweepings in advance and removing the refuse without dust. This machine, under the control of one man, moves over a paved street at a speed of from four to five miles an hour, sweeping a strip eight feet wide. This motor-driven machine is carried on three wheels, thus giving a three-point suspension, and can turn around in a short radius. The superintendent of streets of Boise, Idaho, has stated that this sweeper has saved the city $2,600 over the previous method, besides having swept twice the area each day. The manufacturer will send a booklet to anyone requesting same.

"SAFETY FIRST" AUTO SAVES AUTO.

The "Safety First" Automobile, which is touring the country in the interests of the Safety First Federation of America, recently had use for some of the "Safety First" devices with which the car is equipped. When the car was passing through Chicago, it came upon a Saxon automobile, which was on fire. The "Safety First" driver took out his Pyrene extinguisher and put out the fire in the Saxon with a few strokes. This was one of the best actual demonstrations of the utility of the "Safety First" devices that the car has made.

The foreman is one of the biggest factors in accident prevention.—*R. E. Smith.*

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THE RELC STATIONARY CHEMICAL FIRE ENGINE.

The Relc Stationary Chemical Fire Extinguisher has recently received the approval of the Underwriters' Laboratories, Inc., Chicago. This stationary chemical extinguisher introduces a new method of extinguishing fire through standpipe and hose, and automatic sprinklers, using chemicals instead of water. The system consists of hose stations throughout a building and automatic sprinklers covering a part or all of a given building. The Relc engine makes it possible to fight fire both automatically and manually at the same time, through sprinklers and hose stations, affording double fire fighting facilities. When the apparatus is in operation a pressure of one hundred and twenty-five to one hundred and sixty pounds per square inch is maintained. The system can be so installed as to protect a given area or a given number of buildings from one stationary chemical tank, thus furnishing effective fire protection at a very low cost. This system is recommended for any unprotected property and will be found especially desirable for hotels, theatres, hospitals, country estates, factories and mercantile establishments and wherever adequate fire protection does not exist. Several of the rating bureaus have already granted rate reductions for the protection this system affords, and it is stated, further credits will shortly be sought from various other associations throughout the United States.

The Automatic Sprinkler Company of America, New York, are the licensees and contractors for installations. The Relc Extinguisher Corporation of America, 1 Liberty street, New York, will be pleased to send descriptive booklet upon request.

FIRST AID TO THE UNINJURED.

A device possessing the quality of First Aid to the Uninjured has recently been designed and placed on the market by The Stonehouse Steel Sign Company, Denver, Col.

In the systematic prevention of accidents the first thing to determine is, Where do most accidents happen and how can their repetition be prevented?

In every plant there are many places which the manager, superintendent, inspector, foreman and others see in their daily rounds and work, which, if properly tagged, might prevent accidents. This new device, the Stonehouse Waterproof Universal Danger tag, is designed for such use, and will prove both effective and convenient.

On one side of the tag, the stock of which is 220-lb. Dennison Manufacturing Company, best quality, is printed in waterproof ink a danger design in red, followed by the admonition that the tag is not to be removed under penalty of dismissal. The other side is left blank for any desired written or printed message which emergency may make necessary, with a place for the date and the signature of the person posting the card.

The tags are strung with wire for fastening, if a few of them are carried in the pockets of every man in authority and used when occasion warrants they will prove an important factor in accident prevention, without doubt.

FIRE CHIEFS ENTERTAINED AT PANAMA-PACIFIC EXPOSITION.

On July 4 a benefit was given to the San Francisco Fire Department in the interest of its fund for entertaining the fire chiefs of the United States and Canada, at which many noted stage stars performed, among them David Warfield and Al Jolson. A Power 6-A motion picture projecting machine was loaned and operated by Mr. R. W. Horn, the Power's representative at the fair, and the Vitagraph picture, "The Lock Door," was shown. The machine was placed in the central box of the theatre. It is a fact of some note that no booth was used by permission of the chief of the San Francisco fire department, thus demonstrating that the machine was absolutely fireproof.

UNDERWRITERS' LABORATORIES.

The particulars of the organization, purpose and methods of the Underwriters' Laboratories, Inc., the principal office and testing station of which are at 207 East Ohio street, Chicago, with branch offices in more than eighty cities, thereby covering the entire country, besides offices in England and Canada, are related fully in a new publication, issued by the corporation and obtainable on request.

This book contains ten views of the plant, laboratories, methods of testing, etc., and fourteen pages of underwriters' labels in colors.

DETROIT FUSE CO. EXPANDS.

Contracts have been let and work started on the new 3-story concrete and steel addition to the plant of the Detroit Fuse & Manufacturing Company, Detroit, Mich. The new building will have 35,000 square feet of floor space, which will give a total of 60,000 square feet for the manufacture of "Square D" steel enclosed switches, "Square D" enclosed fused switches, "Square D" induction motor starters and "Arkless" enclosed fuses. The new building will be built along the latest designs of factory construction, and will be equipped with the most modern machinery obtainable. This addition, which is to cost about $60,000, is the second made necessary by the company's increased business since its first building was erecteed in 1909, the first addition being built in 1912. President Bryson D. Horton, in speaking of the rapid advance this company has made, stated that in June, 1915, the largest month's business in the history of the company was placed.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

ASSOCIATED, ISSUE B, AUTOMATIC SPRINKLER. Standard Inspection Service Associated Automatic Sprinkler Co. This manufacturer is equipped to install this sprinkler in the following patterns: Ordinary (uncolored), Intermediate (colored white), Hard (colored blue), Extra Hard (colored red), all for use under ordinary conditions. Wax coated ordinary degree sprinklers for use under severe conditions of corrosion. These sprinklers are capable of resisting corrosion for reasonable periods of time, but in common with other materials of its class, the coating requires renewal at intervals, the frequency of renewals depending on the severity of the atmospheric conditions.

J. P. BAKELITE. Johns-Pratt Co. H. W. Johns-Manville Co., sole agents. This is a moulded insulating material with high dieletric strength. It is not strictly non-combustible although somewhat brittle, has moderate mechanical strength. Its absorption of moisture is very small and it is affected little, if at all, by oils or acids. It is suitable for use where a material moulded in shapes or flat pieces is desired for use, in electrical appliances where it will not be exposed to high temperatures, and where a material having the properties indicated above is required for parts or bases of electrical appliances.

BOWES "LABELED" STORAGE RACK. Allen Mfg. Co., W. D. Non-automatic rack for use in connection with interior standpipe system and for 50 to 100 ft. of 2½-in. unlined linen fire hose. It is destined for use of fire departments and those trained in handling heavy fire streams.

CABINETS METAL. Sprague Electric Works of General Electric Co

CANS WASTE. S. & K. Manufacturing Co. Cylindrical waste can made of galvanized iron or steel in six sizes, provided with riveted band-iron legs, automatically closing cover and suitable handles.

CAR-HEATING SYSTEM HOT AIR. Cooper Heater Co. Forced ventilation hot air car heating system using anthracite coal and intended principally for heating electric coaches. Equipment consists of heater, motor and blower, stove pipes, and hot air distributing duct.

CHEMICAL EXTINGUISHERS, two and half gallon break bottle type. Minimax Co.

DOORS AND SHUTTERS, COMPOSITE. Fire Door for Opening in Fire Wall. Alignum Products Co. Doors are either sliding or swinging type 1⅞ ins. thick, made of fire resisting composition known as alignum and covered with No. 26 U. S. gauge sheet steel. Alignum reinforced with steel and parts fastened together with through bolts. Large doors made in two or more units fastened together by spline construction. Sliding doors standard for openings not exceeding 80 sq. ft. Swinging doors standard for openings not exceeding 48 ins. in width and 8 ft. in height, when mounted singly, and for openings not exceeding 72 ins. in width and 8 ft. in height when mounted in pairs; when equipped with standard hardware for sliding or swinging type, or in case of swinging doors with butt hinges and a standard, and properly adjusted three-point locking mechanism.

DOORS AND SHUTTERS, COMPOSITE. Fire Door for Opening in Vertical Shaft. Alignum Products Co., mfr. Doors of sliding or swinging type not less than 1¾ ins. thick, made of a fire resisting composition covered with No. 26 U. S. gauge black sheet steel, provided with steel reinforcements and parts fastened together by special through bolts. Standard for openings not exceeding 48 ins. in width and 8 ft. in height when mounted singly, and for openings not exceeding 72 ins. in width and 8 ft. in height when mounted in pairs when equipped with standard and properly adjusted hardware for openings in vertical shafts.

DOORS AND SHUTTERS, HARDWARE. P. & F. Corbin, Division of American Hardware Corp. Two-point locking mechanism for the inactive member of a pair of single swinging doors.

DOORS AND SHUTTERS, HARDWARE. Lee, Thomas. Hardware of Sliding Type for Standard Tin-Clad Fire Doors.

DOORS AND SHUTTERS, HARDWARE. Harry C. Knisely Co. Two and three-point locking mechanism for signal swinging hollow metal doors.

DOORS AND SHUTTERS, METAL-CLAD. Century Fireproof Door Co., The. Tin-clad fire doors and shutters, constructed in accordance with requirements of the National Board of Fire Underwriters. Designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. Irwin & Son, Thomas. Tin-clad fire doors and shutters, constructed in accordance with the requirements of the National Board of Fire Underwriters. Designed for the protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. Sixth City Sheet Metal Works. Tin-clad fire doors and shutters, constructed in accordance with requirements of the National Board of Fire Underwriters. Designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. World Fire Proof Door & Sash Co., Inc. Tin-clad fire doors and shutters, constructed in accordance with requirements of the National Board of Fire Underwriters. Designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL. Harry C. Knisely Co. Fire door for opening in corridor or room partition. Doors made of black sheet steel. Styles and rails of hollow construction. Panel, if not glass, made of asbestos board covered with metal. Glass panels secured with removable closure strips in top rails or removable muntins.

DOORS AND SHUTTERS, METAL. Merchant & Evans Co. Evans' "Almetl" fire door for openings in fire walls; sliding and swinging type. Door made of two sheets of corrugated, galvanized sheet steel stiffened at edges by a steel frame. Corru-

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gations horizontal on side next to wall and vertical on other side. One-eighth inch asbestos board between corrugated sheets.

DOORS AND SHUTTERS, METAL-CLAD. Syracuse Fire Door Co. Tin-clad fire doors and shutters, constructed in accordance with the requirements of the National Board of Fire Underwriters. Designed for the protection of openings in walls and partitions.

FIBER. Bakelite-Dilecto [illegible]ental Fiber Co. A fiber material with a bakelite binder. Laboratories' tests show that this material has good dielectric strength, is practically non-absorptive, can be readily worked with tools, and is combustible to about the same extent as fiber.

FIRE DOORS for Opening in Corridor and Room Partition. Doors and Shutters, Composite. Alignum Products Co. Door of sliding or swinging type not less than 1¼ ins. thick, made of fire resisting composition covered with No. 26 U. S. gauge sheet steel; provided with steel reinforcements. Parts fastened together by special through bolts. Standard for openings without limitation in size when equipped with ordinary heavy hardware.

FUSIBLE LINK. Yates, J. W. Yates Issue "B" Fusible Link for use in connection with automatic closing devices for doors, windows and other automatic devices requiring fusible links.

GLOBE, ISSUE B, AUTOMATIC SPRINKLER. Standard Inspection Bureau. Globe Automatic Sprinkler Co. This manufacturer is equipped to install this sprinkler in the following patterns: Ordinary (uncolored), Intermediate (colored white), Hard (colored blue), Extra Hard (colored red), all for use under ordinary conditions. Dull brass plated ordinary degree sprinklers for use where ornamental finish is desired. All parts of sprinklers, with the exception of fusible links, are electrolytically plated with brass. Fusible links are identical with the regular pattern sprinklers. Wax coated ordinary degree sprinklers for use under severe conditions of corrosion. These sprinklers are capable of resisting corrosion for reasonable periods of time, but in common with other materials of its class, the coating requires renewal at intervals, the frequency of renewals depending on the severity of the atmospheric conditions.

HOSE, GASOLINE. American Metal Hose Co. A three-quarter inch flexible rubber-metal hose used to conduct gasoline. It consists of an interlocking, flexible brass inner tube, with an asbestos packing, surrounded by a rubber tube and covered with a woven cotton jacket.

RELC STATIONARY CHEMICAL EXTINGUISHER, 100 GALLON. Automatic Sprinkler Co. of America. Submittor. Stationary chemical fire extinguisher: for connection to a standpipe system provided with hose stations; cylindrical tank made of Allegheny Iron; liquid capacity 100 gal.; chemicals used, bicarbonate of soda and sulphuric acid. Extinguisher placed in operation by inversion of the acid receptacle, this being accomplished by creating a pressure difference between tank and distributing piping. This pressure difference is created by a fairly sudden reduction in pressure in piping, due to opening any nose valve, system normally being under air pressure.

RHEOSTATS. Westinghouse Electric & Mfg. Co. 126 to 650 V., all capacities. Motor starters: Types D, DM, G, ZA, ZB. Starting and regulating: Types DA, DAC, DAS, DS, DC, H, HC, HS, I, IC, IS, ZC, ZD, ZE, ZF, ZG, ZH. Battery charging: Type DB. Field rheostats: Types J, JA, JB, JC, JD, JE. Resistance units: Type DE; also "Bobbin," "Bar" and "Grid" types.

SPRINKLERS, AUTOMATIC. Esty Sprinkler Co., mfr. Esty Issue "B" Automatic Sprinkler. H. G. Vogel Co., sole agents.

WATER STERILIZER. Electric Water Sterilizer Co. This equipment comprises an electrode box containing metal plates, in connection with a D. C. circuit, between and around which the water passes; a coagulation chamber; two filter tanks and a water-controlled switch.

WINDOWS. Angle Window and Door Co. Double Hung Window. Metallic window frame glazed with standard wired glass. Frame made of No. 16 U. S. gauge cold rolled furniture stock sheet steel coated with baked enamel except parts that cannot be replaced which are made of No. 16 U. S. gauge sheet steel, galvanized. Sashes made of ⅛-in. angles and No. 18 U. S. gauge cold rolled furniture stock steel coated with baked enamel. Sashes hung with sherardized steel tapes. These windows in sizes not larger than 5 by 9 ft. are standard for use in exterior openings where the exposure is not severe.

WINDOWS. Stremel Brothers Roofing and Cornice Co. Hollow metallic window frames and sashes for protection of exterior openings, made in following patterns: Double hung; Twin double hung; Dougle hung with stationary transom; Double hung with top hinged transom; Double hung with pivoted transom; Stationary; Twin Stationary; Top hinged; Twin top hinged; Pivoted; Reverse pivoted; Multiple pivoted; Single pivoted, Twin pivoted.

RECENT CATALOGUES OF SAFETY DEVICES AND METHODS

By writing the firms the publications may be obtained without cost.
Please mention SAFETY ENGINEERING.

Esty Sprinkler.

H. G. Vogel Co., 12-14 Walker St., New York.
Facts concerning the Esty Sprinkler and how reduced insurance rates resulting from itsinstallation pay for initial cost.

Fire Extinguishers.

O. J. Childs Co., Utica, N. Y.
Interesting booklets have been issued by this company devoted to "Childs" extinguishers, chemical engines and chemical tanks.

Fire Prevention and Protection.

American-La France Fire Engine Co., Inc.
Under this heading the above company has issued a catalogue of great value. It is a book of over 260 pages containing numerous illustrations, and covers nearly all of their lines except horse-drawn and motor municipal fire department apparatus, special catalogues being issued for them.

Fire Telephone.

King Fire Signal Co.,
95 William Street, New York.
An interesting folder devoted to the Fire Telephone and showing how its installation ensures "Not 'Safety First'—but Safety Always" by providing a watchman in every room, on every floor, always awake and ready to detect a fire as soon as it starts. Reliability, Simplicity and Low Installation Cost are features claimed for this system.

Mineral Wool.

U. S. Mineral Wool Company,
140 Cedar St., New York.
"The Users of Mineral Wool in Architecture" points out the important qualities of this product, which possesses unequal power to resist the transmission of heat and cold, and is non-combustible, contains information of value to architects and builders in connection with the insulation of heat and cold, deafening and fireproofing; points out the value of this material as a protection against fire. A list of representative users and testimonials are included.

Watchman's Portable Clock.

E. O. Hausburg, 45 Maiden Lane, New York.
New folder devoted to a description of the "Standard" Watchman's Portable Clock, of which over 60,000 are in use and which is used by the Army and Navy of the United States.

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SAFETY ENGINEERING

Vol. 30 SEPTEMBER, 1915 No. 3

Current Comment and News

AS the result of an explosion of dynamite in the Seventh Avenue subway between 24th and 25th streets, on the morning of September 22, several persons were killed and scores were injured. Directly over the spot where the explosion occurred were a well-filled trolley car, a heavy auto-truck and many pedestrians. They were precipitated into a 30-foot abyss, and according to the earliest accounts at least eight persons were killed outright. For nearly two blocks the excavation was a mass of splintered timbers, twisted water pipes, gas mains and subway tracks. The knowledge that dynamite under the mass of wreckage, still undischarged, might explode at any instant, made the work of rescue perilous. In explanation of the cause of the accident, representatives of the contractors said that the explosion probably knocked down some of the subway shoring, permitting the plank structure, which formed the street cover over which travel passed, to fall into the excavation. Only a few of the workmen had arrived to go to work. Many persons remained buried under the debris for hours before they were rescued. Fortunately there was no fire, but the gas fumes were a menace to the firemen and police engaged in the rescue work.

Detroit's Traffic Semaphore.

The Federal Grand Jury at Chicago has indicted six officials of the steamboat company and two government steamboat inspectors in connection with the *Eastland* disaster, on July 24 last. The indictments charge conspiracy and criminal carelessness resulting in the death of 812 persons. Indictments were also found against the Chicago-St. Joseph Company and the Indiana Transportation Company, as corporations.

The New York Health Board has undertaken a no more important task recently than that of eliminating the possibility of spreading diseases in restaurants. It is a long stride toward "Safety First," and its ramifications are broader than one is at first able to comprehend. There are nearly 5,000 restaurants and hotels in New York City, employing something like 100,000 waiters and cooks. All of these persons are to undergo an examination at the hands of a Board of Health physician, after which no unlicensed applicant will be given employment in a public restaurant or dining room. A preliminary investigation has shown that many waiters and cooks are suffering from tuberculosis, are typhoid carriers, or are affiliated in other ways tending to endanger patrons. However small may be the percentage of diseased waiters, the percentage must be eliminated. The "Safety First" move of the Board of Health may lead to an insistence by individual citizens that the cooks in their homes be licensed as an assurance of their freedom from disease.

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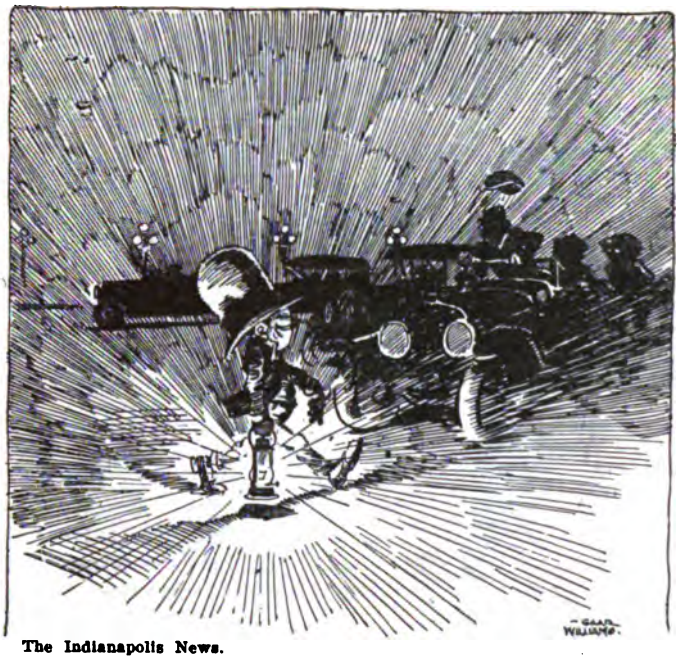
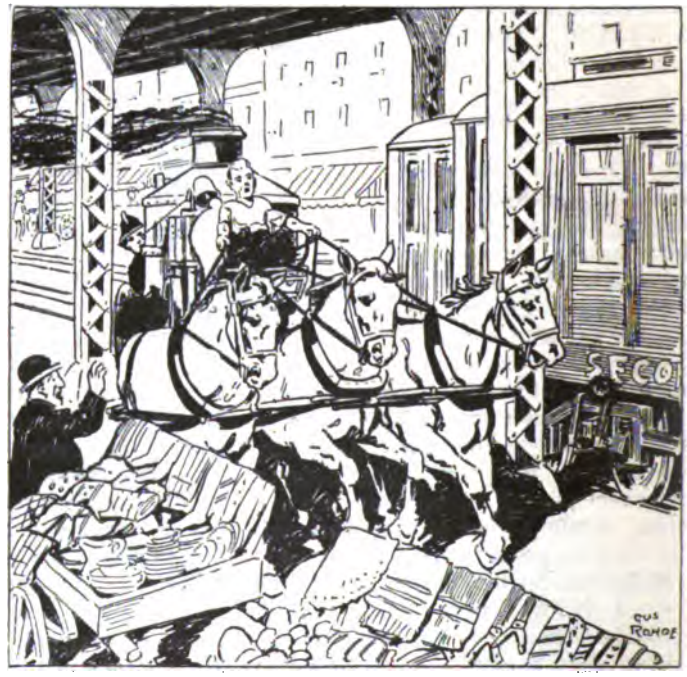


The Indianapolis News.

The latest departure in spreading the "Safety First" propaganda is by exhibits and demonstrations at State fairs. Ohio appears to have set the pace at a recent agricultural display in Columbus. Victor T. Noonan, "Safety First" expert for the industrial commission, prepared a mammoth "accident and disease prevention" display in which the State, manufacturing, mining and railroad companies participated. The exhibit was part of the State's campaign to cut at least 50 per cent of the number of fatal and non-fatal industrial accidents. Last year Ohio had 80,000 shop accidents.

NOW WITH THE DIMMERS.

One of the notable illustrations of the movement for safety promotion is the announcement by the American Museum of Safety of the annual contest for the medals given by the heirs of the late Anthony N. Brady, one of the most famous of American electric railroad men, who died about two years ago. A costly gold medal will be given to the electric railway which has done most during the year to promote and conserve the health and safety of its employes and the public. Printed conditions of the contest have been sent to 800 electric railways, returns from which must be submitted before October 1, and the awards will be made in December.



Harlem Local News.

Conditions in Second and Third Avenues, between 110th and 120th Streets, which the Merchants and Taxpayers League of Harlem is combating.

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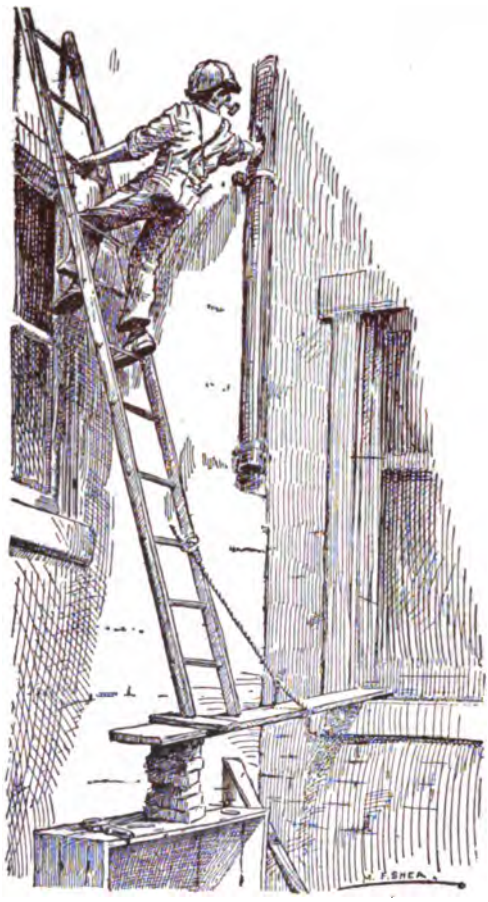
That two human lives should have been sacrificed at a fire because a water tower was unable to send a stream of water strong enough to break the windows through which the victims sought to escape, is a matter that calls for investigation by the authorities of Jersey City. When a fire broke out in the American House on Montgomery street, about 10 o'clock a. m., recently, the fire department responded promptly, but it is reported authentically that the fire tower was unable to send a stream to the fifth floor where the two unfortunate lodgers were imprisoned. The fact that the tower had not sufficient supply of water for several minutes, is said to have been caused by the engine that supplied its hose, not having but five pounds of steam up when it left the fire house. If two men in broad daylight were unable to locate the single fire escape in the rear, the death toll, had the fire occurred at night, would doubtless have been frightful.

The gradual merging of the science of fire-fighting with that of fire-prevention was further emphasized at the recent convention of the International Association of Fire Engineers in Cincinnati. The idea of removing the cause of fire instead of disregarding it and then combating the element in its fury has taken permanent hold upon the chiefs of American fire departments, and the impetus given to prevention work at the Cincinnati convention will produce much good everywhere. Papers were read advocating thorough inspections in all cities and towns, with a view to eliminating every possible cause of fire. Strangely enough, it was pointed out that difficulties are encountered among the foreign, or non-English speaking people, who, failing to understand the purpose of the inspections, feel that their liberties are being abridged or violated. Yet these people come from European countries where the Code Napoleon holds the owners of property responsible for fires originating on their premises, under severe penalties. A resolution was adopted at Cincinnati to the effect that the State employ competent engineers to visit the smaller towns and instruct firemen in prevention work, and in the use of modern fire apparatus. In the future fire departments may be equally fire prevention and fire extinguishing agencies, the firemen to be divided into two groups—fire fighters and fire preventers. A number of papers were read on important subjects, some of which appear in this number of SAFETY ENGINEERING—the discussion of nitric acid dangers, and papers on the compulsory installation of automatic sprinklers, the testing of fireproofed theatrical scenery, fire department organization in industrial plants and fire department work in fire prevention.



From Judge.

Should this man fall, it would be hard to convince him that it wasn't due to his usual "bum luck."

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THE USE OF GASOLENE IN THE HOME

By Charles E. Worthington, Wellesley Hills, Mass.

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GASOLENE has two uses in the household, as a solvent of grease and oils for cleansing purposes and as a source of heat for cooking, or more rarely for light.

As a solvent of grease it is not likely that any popular substitute will be found, not that it is the most effective or the safest, but that it is by far the most easily procurable and at the lowest cost. Carbon-tetrachloride is even a better solvent, but its cost, like that of several other compounds of similar nature, is generally prohibitive and it is not readily procurable. Chloroform is likewise costly and possesses other objectionable features for general use, while most other hydrocarbon solvents are even more hazardous than gasolene so far as fire hazard is concerned, and possess disagreeable qualities in addition. It is quite safe to assume therefore that gasolene has come to stay, at least as long as present conditions last.

Gasolene is one of the lighter products of petroleum obtained by distilling that substance in heated stills and condensing the resulting vapors. There are several methods followed in this procedure but the general principle is the same in all.

When we begin to consider these products in detail, we are met at once by a confusion of names, every country and nearly every authority differing in that respect, the situation being further confused by the multitude of "trade names" which convey no real intimation of the exact nature of the article. Some allowance must be made for this condition in generalizing on this subject in a non-technical discussion like this paper.

The first and lightest product of this distillation is known as Rhigolene, Cymogene, Keroselene, Petroleumether, etc., etc. This much named substance has a specific gravity of .62 and *boils* (according to various authorities) at temperatures between 65 degrees and 113 degrees Fahrenheit. It evaporates almost instantaneously on exposure to air, rapidly enough to sometimes freeze the surface to which it is applied leading to its use to some extent in surgery to produce local insensibility.

As might be inferred, this substance is too dangerous to be commercially available to any great extent.

The next to come over is (technically) Gasolene, specific gravity .66, average boiling point about 122 degrees Fah. Then follows a series of naphthas ranging in specific gravity from .70 to .74 with a boiling point *averaging* somewhere about 190 degrees Fah. Lower than this the product is illuminating oil (Kerosene) with an approximate specific gravity of .80 and boiling point higher than 200 degrees Fah.

All of the above, which are lighter than kerosene are properly volatile naphthas. Similar naphtha derived from the distillation of coal tar is properly Benzine, though deodorized (not very much deodorized) naphtha is sometimes sold under that name, and the slightly differing naphthas from other substances have names of their own. Commercially, however, only those from petroleum or coal tar are usually encountered. Coal oil, obtained by distillation of bituminous shales (cannel coal) has practically ceased to exist commercially because of its cost. Naphthas from this distillation differed little from the others.

The distinction between gasolene and the series of naphthas has largely broken down commercially under the increasing demand, so that we may practically consider naphtha and gasolene as applying to the same fluid, using naphtha to signify both commercial as well as technical naphtha and gasolene without discrimination.

Naphtha is a hydro-carbon, that is, it is composed of hydrogen and carbon. Hydrogen is the gas which unites with oxygen to produce the hottest flame known. Carbon unites readily with oxygen with the evolution of heat; practically all of the fire we know being the result of this union. Coal and wood are composed chiefly of carbon.

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Naphtha is exceedingly volatile, that is, it passes off rapidly in the form of vapor when exposed to the air. This vapor is nearly three times as heavy as air (2.77 times) and consequently does not diffuse or mix readily with air but is "migratory," flowing like water although quite invisible; it does, however, mix with air to some extent.

As a substance naphtha contains no oxygen and will not burn until vaporized so that in reality it is the vapor that burns. This vapor is given off freely at all ordinary temperatures and is very combustible, igniting instantly upon contact with a spark or flame or even a sufficiently heated surface. When mixed with 2.6 per cent. of its own volume of air the mixture becomes violently explosive, the explosive quality ceasing when the admixture exceeds 7 per cent. the power to ignite, flash and conduct fire, however, persisting very far beyond the explosive limit. The flash point, that is the temperature at which this dangerous vapor is first given off in considerable quantities, is very low, the highest given by any authority being 15 degrees below zero, Fah., many stating it at a much lower point. The ignition point, that is, the temperature at which this flash will ignite the substance (in this case produce continuous vaporization and fire) is practically the same as the flash point in all volatile naphthas.

It must not be assumed that vaporization ceases at the low point named. On the contrary it merely slows down, so that while an open vessel of naphtha will not ignite in response to the ordinary tests at that temperature, if it is kept exposed in a confined space for sometime, enough vapor will accumulate to flash even at lower temperatures than named. Heat, however, increases the rate of vaporization and the warmer the air and material, the greater the danger.

It is in the "migrating" quality that the greatest hazard of naphtha lies. Most explosives require fire to be brought to them, but naphtha searches out the fire. It will run in a stream along the ground, follow down a stairway, seek out a crack in a floor at a considerable distance, and finding the fire flash it back until it reaches the point where the mixture of air and vapor is explosive (that point *always* exists somewhere) and ignite the vapor upon the surface (the equivalent of igniting the material).

Instances are very numerous of this occurring at distances exceeding fifty feet, in many cases approximating 300 feet and as concerns those under fifty feet, almost innumerable.

Further, because of its low rate of diffusion (miscibility) it will run into a pocket or depression and remain there in an explosive condition for a long time, often months. Hence it is not sufficient that there be no flame in the room where it is used as a flame in an adjacent room or on a floor below may suffice to precipitate the accident for sometime after use, in the absence of thorough ventilation.

Aside from this, naphtha possesses a feature of extreme hazard in its ability to accumulate electricity. This is developed by mere agitation of the naphtha, or by rubbing articles in it, and has given rise to many distressing accidents.

Probably there is a personal factor in this as the electrical excitability or conductivity of people is an exceedingly variable quantity, but not to the extent of extending probable immunity to any one. Hence the practice of rubbing or even moving about any article in an open vessel of naphtha is accompanied by considerable danger, becoming imminent under certain unrecognized conditions of the atmosphere (or general electrical conditions) and greater if silk or wool is rubbed than with vegetable fibres like cotton and further varying with different individuals or the same individual at different times, but always present. Ignition in these cases proceeds from a spark generated in the material or following the withdrawal of the hand, or even proceeding from external sources.

The list of severe and fatal injuries from this cause is distressingly long and as the precise combination of conditions leading up to trouble is generally undiscoverable at the moment, the only remedy is to refrain entirely.

Another not infrequent cause of trouble is the accidental use of naphtha for kerosene. This mistake is made possible by the similarity of appearance and odor,

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especially where, as is too frequently the case, the legal flash point of kerosene is low and high test kerosene has been thinned with naphtha to reduce it to the minimum. While therefore it is clear that under any circumstances the use of naphtha (gasolene) is always attended by some danger, it is possible by the observance of a few simple precautions to minimize the hazards. These precautions may be formulated into rules, thus:

First: *Never* use naphtha where there is an open light or fire (gas, candles, kerosene lamps or stoves, cook stoves, all are open lights or fires) in the same room or any room on the same floor within 50′ or *on the floor below.* It is an advantage to have open windows and free currents of air about the place of use. Wherever possible it should be used in the open air (out of doors). In any event, try to have one *door* to the outer air open. The vapors are heavier than air and will run over the threshold, but will not lift to the level of a window sill.

Second: *Never* keep naphtha in any quantity (however small) in a glass bottle or other breakable container, or one unstoppered or insecurely stoppered. A small quantity of naphtha spilled and vaporized at once renders a considerable volume of air explosive, one pint being sufficient to impart maximum explosibility to 200 cubic feet of air. There is but *one* reasonably safe way to keep small quantities of naphtha, and that is in a "safety can." This is a legal requirement in some localities. Such cans bearing the approval of the Underwriters' Laboratories may be had at any hardware store. They are practically unbreakable and are closed by stoppers operating from the inside by springs which must be held down while the contents are being withdrawn. If accidently upset they do not spill their contents, and also because of their shape and the necessity of special manipulation for withdrawal they cannot by any possibility be used in mistake for kerosene cans.

Third: *Never* keep naphtha, no matter how contained, near a fire or in a warm place.

Fourth: *Never* pour naphtha into a glass, china or earthenware dish and rub *any* article in it, even cotton, which though less dangerous than silk or wool, is still hazardous. Remember that naphtha is easily electrified, perhaps the most easily of any substance in common use and human legs are better electrical conductors than table legs. Therefore, as the discharge of electricity always seeks the ground, placing such a dish on a table is especially dangerous. If rubbing is apparently necessary use a metal dish, placed directly upon the earth (if the earth is damp, so much the better) and do the rubbing as far as is possible with two sticks. Do not place a board or any other thing between the pan and the earth.

The practice of cleaning kid gloves in naphtha while stretched upon the hands does not appear to be especially hazardous provided proper precautions, such as lights, fires and ventilation are observed, *and provided the rubbing is done while the hands are out of and not within six inches of the naphtha,* but the naphtha should not be agitated by moving the hands about in it quickly or violently.

Fifth: Hang all goods that have been cleaned with or in any manner saturated with naphtha in the open air until the odor practically disappears and do not press or iron while the odor remains. The temperature of the air may be wholly disregarded as naphtha does not freeze, and evaporates freely at any temperature above 15 degrees below zero, merely slowing down in rate of evaporation by cold.

Sixth: Sprinkling furniture, etc., to kill moths should be done out of doors and the article remain outside while the odor persists. Do not sprinkle naphtha about the edges of carpets to kill moths. A weak solution of corrosive sublimate (mercury bi-chloride) is more effective and is comparatively *permanent.* In these rare cases where water cannot be used, there are other effective means. In such cases a mixture of 60 per cent carbon tetrachloride and 40 per cent naphtha may be used if all of the precautions as to fires and lights are observed for at least six hours after application and all windows and doors are kept open.

Seventh: Do not keep a supply of naphtha for stove or lamps in the house, *especially not in a cellar* where the vapor from a possible leak might accumulate. If the amount used does not justify a

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buried tank and a box well removed from the house is inconvenient, keep the can on a shelf four feet or thereabouts from the ground as far from any window as practicable. A five or ten gallon can may be so kept with reasonable safety if the stopper is tight and effective. Cans with effective stoppers cost little if any more than those requiring corks and should be insisted upon. Cork stoppers for naphtha cans should not be used. As to naphtha stoves or lights, their use must be dictated by the needs of the particular case, but cannot be denied. In purchasing such apparatus, care should be observed to get only those of the safest types. The approval of the Underwriters' Laboratories which covers the output of the seven principal manufacturers of naphtha stoves is the best guide.

The complete observance of the seven rules set forth will eliminate the hazards of handling and using naphtha in the household about as completely as such elimination is possible. None is expensive, onerous or impractical.

It should be noted that the properties of benzine are practically identical with those of naphthas in general and further that kerosene (of lower than 150 degrees fire test) contains a considerable proportion of volatile naphtha, often introduced by dealers to reduce the fire test to the minimum legal point and that it is better to keep it in a cool and well ventilated place and not leave the can unstoppered. In the event of naphtha becoming ignited, water should never be thrown upon it. Earth or sand applied liberally is the best, wet woolen blankets or rugs may be used with good effect to smother the flames and *water* may be thrown in moderate quantities *upon the rugs or blankets.* Salt is good and soda (baking soda-soda bicarbonate) still better if available in sufficient quantity. If none of these can be had, throw on flour liberally, to smother the fire, mixing whatever salt and soda are at hand with the flour.

The combustion of naphtha depends wholly upon a free supply of air and the method of extinguishment is to cut off the air supply by applying sufficient noncombustible or lightly combustible material in sufficient quantity. The danger is by no means over when the actual fire is extinguished, as combustible (or explosive) vapors will be emitted from the unconsumed naphtha until it is entirely evaporated, a process requiring some time if the extinguishing material is to any degree absorbent.

Hence after a naphtha fire is extinguished the extinguishing material should at once be removed to the air and great care exercised to keep all fire or lights away from the immediate vicinity (50 feet or thereabouts from the actual locality) until all odor has disappeared. Until this is the case all doors and windows should be kept open.

In disposing of used or soiled naphtha care should be used to insure its complete evaporation and mixture with a large quantity of air and that the vapor or material will not get into "pockets," sewers or cesspools.

In sewers and cesspools conditions are frequently such that an exceedingly small mixture or percentage of naphtha vapor is likely to impart some highly objectionable qualities to gases and vapors already generated there. In such case "there is not enough of it to do any harm" does not apply and there is no way of finding out in advance just what conditions exist.

MOISTURE CONTENT OF GRAIN

The Mutual Fire Prevention Bureau, Oxford, Mich., says that the excessive moisture content in grain of the 1915 crop is causing untold loss and great difficulty to the millers and elevator owners of the country. The bureau will furnish standard specifications for the installation of driers.

FIRE ENGINEERS' CONVENTION

According to the rules of the International Association of Fire Engineers, Chief H. L. Marston of Brockton, Mass., first vice president, automatically became president for the ensuing year. A. A. Rosetta of Nashville, Tenn., was elected first vice president; James McFall of Roanoke, Va., was re-elected secretary; George Knofflock of Mansfield, Ohio, was re-elected treasurer. Providence was chosen for the 1916 convention.

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MICE AND MATCHES

By Lincoln E. Slater, Chief of Fire Department, Chester, Pa.

SAFETY ENGINEERING is always brimful of good advice for a fireman to read and familiarize himself with, happenings which have been tested and tried out.

In the February issue of this year, an article by F. V. D. Cruser, gave tests that were very interesting. It is my firm belief, also, that rats and mice do not nibble at matches for food. If they do get at them, it is for some other purpose than using them as food. Rats and mice will very often nibble at a paper bag or pasteboard box to get the paste or gum with which they are pasted, and may accidentally strike the head of a match. It is my opinion that rats will carry matches away to build their nests with, as I have known matches to be found in partitions between the plaster and weather boards.

I am mailing to you a match box which had about 12 or fifteen matches in it. This box was handed to me by a neighbor opposite to where I live. She said it was on the mantel, back of the stove, and the box was about one-third open. On the night of February 8, 1915, while she was sitting in the room, a mouse jumped out of the box, and ran along the mantelpiece, and she ran after it. The next morning, upon coming down stairs and going to the match box, she found that the matches had been broken into small pieces, as you will see them in the box I am sending.

It seems to me that the sticks were broken to a convenient size that would enable the mouse to carry them away to build its nest with, but what puzzles me is that I could not find the heads of any of the matches. The house the lady lives in is a 2½-story frame.

Photograph of a match box containing small pieces of match sticks, the remainder having been carried away by mice. For the purpose of making the photograph, the pieces of the match sticks left in the box by the mice were taken out and placed on the top of the box, as here shown.

BE CAREFUL

A large industrial corporation intends to substitute the phrase "Be Careful" for "Safety First." The corporation maintains that "Be Careful" is more explicit and incisive than "Safety First."

LOOSE CLOTHING

One hundred victims of "loose-clothing-caught-in-machinery" were recorded in a single State during a period of two years.

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HANDLING AND STORING NITRIC ACID

THE "Proper Restrictions for Storage and Handling of Nitric Acid" was a subject discussed at the annual convention of the International Association of Fire Engineers in Cincinnati, by John F. Healy, chief of the Denver Fire Department, and Thomas A. Clancy, chief of the Milwaukee Fire Department.

CHIEF HEALY: The proper restrictions for storage and handling of nitric acid is a matter of great interest to all of us, from the fact that nitric acid, coming in contact with organic matter, generates nitrous oxides, which may be very irritating at the time of inhalation, and again, the irritation may not be noticeable for several hours; however, in either instance, dangerous symptoms will follow, that ultimately may result in death.

Nitric acid is a compound of 1.5 per cent hydrogen, 22.2 per cent nitrogen, and 76.3 per cent oxygen. The modern method of preparing it, apparently first described by "Glauber" in the seventeenth century, is by heating niter with strong sulphuric acid. In this process, "Chili" saltpeter (sodium nitrate) is decomposed by sulphuric acid in cast iron retorts—iron is not seriously attacked by concentrated mixtures of sulphuric or nitric acids—when nitric acid is volatized and driven off, while acid sodium sulphate remains; the nitric acid is condensed in large earthenware bottles.

The United States Pharmacopœia makes the following statement on nitric acid: "It is a liquid composed of 68 per cent by weight of absolute nitric acid, and 32 per cent. of water." Nitric acid is extensively used in the manufacture of nitroglycerine, coal tar dyes, phosphoric acid, arsenious acid, and sulphuric acid. It is used in electroplating, and etching cuts for printing purposes, also for the parting of gold and silver bullion, and it is largely used in the arts and manufactures.

During the year 1914, approximately 200,000,000 pounds of nitric acid were made in the United States. It is a corrosive liquid, and acts peculiarly, abstracting hydrogen (or water) from vegetable matter, or fiber, and oxidizing the remaining elements. It varies in degrees of strength. The lowest or 38 degrees (Beaume), under ordinary conditions, is not very dangerous, but over 43 degrees (Beaume) it is very dangerous.

Manufacturers using nitric acid in large quantities should keep it stored in a building constructed expressly for that purpose, having a dirt floor, and well equipped with windows for ventilation, that should be located as close to the floor as possible, and easily opened from either side. The building should be erected where it will be shaded from the direct rays of the sun, and there is no need, even during the winter season, of supplying artificial heat. In fact, nitric acid should at all times be stored in a cool place, as there is great danger, when it becomes warm, that it will expand, and cause the carboy to crack, or burst, thereby allowing the acid to leak, or overflow. There should be a space of not less than 6 inches between the carboys, and under no condition must they be placed more than 1 in height; neither should anything be laid or stored on top of a carboy containing nitric acid.

Large quantities of loose dirt, or sand, should be kept close at hand. Should an accident occur, the proper remedy is to apply enough of either, or both of these substances, to completely absorb the acid. There is absolutely no danger attached to applying dirt or sand to nitric acid; it is only when the acid comes in contact with organic matter that it becomes a menace. If either of these remedies is not available, an abundance of water must be applied, not only to the acid on the floor, but to the carboy, or carboys, that contain it, as well. The Interstate Commerce Commission adopted regulations for the transportation of corrosive liquids, effective October 1, 1914. This group includes the strong mineral acids, and other strongly corrosive liquids that are liable to cause fires when mixed with chemicals, or with organic matter, or are liable, in case of leakage from their ship-

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ping containers, to damage other freight materially; special attention is given to bottles, or vessels of any kind, used for nitric acid.

Any glass container, with a nominal capacity, not less than 10 gallons, shall be classed as a carboy, and no carboy used for shipment shall have a nominal capacity of more than 13 gallons, and must contain a minimum of 16¾ pounds of glass. All wooden carboy boxes used as containers must be made of good white pine, or any wood of equal, or superior strength; minimum thickness of lumber must not be less than seven-eighths of an inch. The box must be reinforced in a suitable manner to secure strength and stiffness, and must be provided with two cleats, one placed on each end for carrying, and two cleats across the ends of the bottom of the box, to act as shoes, to protect the bottom of the carboy. The box must be nailed with nails not smaller than 8-penny, at approximately 2½ inch centers. The sides and ends of the box must be nailed together, and also to the reinforcing pieces. The carboy must be well cushioned, by incombustible packing material that covers the bottom and sides of the carboy, and fits tightly in the outside wooden box. The carboy must be closed by an earthenware, or glass, stopper, inserted in the mouth of the carboy, sealed in place by plaster of Paris, or similar material, in a plastic condition, and securely fastened with burlap, or other suitable material, drawn tight and securely tied under the lip of the mouth with strong cord. The outside container must be plainly marked with letters and figures, giving the name of manufacturer and description of acid contained therein, together with approval of the Interstate Commerce Commission.

A FATAL FIRE IN DENVER CAUSED BY THE BREAKING OF A NITRIC ACID CARBOY.

As evidence of the fact that a portable chemical, or chemical engine, should not be used to extinguish fires caused by nitric acid, I beg leave to relate the following, of which I have personal knowledge: The Denver fire department was called to a fire in a printing establishment, on September 20, 1904, caused by the accidental breaking of a carboy of nitric acid, in an attempt to remove the stopper with a hammer. The acid spread across the floor, coming in contact with the zinc used in etching. Employes used sawdust to absorb it, which rapidly oxidizing, caught fire. The fire was extinguished by the use of two 3-gallon chemical extinguishers, together with a small amount of water. Eighteen firemen and two men employed in the establishment were affected, seriously enough to demand medical aid. Of these, 4 died, 2 on the second day from the direct consequences, and 2 several weeks later from relapse. The immediate symptoms were as follows: Difficulty in breathing, pain in the stomach, pain in the chest, headache, dryness in the nose and throat, coughing, vomiting, dizziness and difficulty in walking. All the firemen returned to their respective stations, not considering themselves seriously ill. After a few hours, many of them sought medical aid, and within 24 hours all of them were in a hospital, the average time in bed for the whole number being 11 days. Relapse occurred in 33 per cent of the cases, generally in the third week, and averaged 15 days in duration. The symptoms were those of the original attack, but of less intensity. The maximum length of time until practical recovery was 210 days, the minimum 90 days. Following this sad accident, the Western Chemical Manufacturing Company of Denver, one of the largest concerns of its kind in the United States, issued the following bulletin, governing the handling of nitric acid, and what to do in case of fire:

We think it advisable to warn you against the great dangers in handling carboys of nitric acid which are broken, and to advise you how to safely handle them. Due care should be used not to jar the necks of the carboys in opening them; a small, cheap saw will readily saw through the plaster of Paris around the stopper, allowing it to come out easily. Heat of any kind will cause the acid in the carboy to swell, and overflowing, will generate heat when it comes in contact with the straw packing of the carboy, and so break the glass bottle. Especially is this true when the carboy is allowed to stand in the sun.

When a carboy of nitric acid is broken in a room, open the windows immediately to secure good ventilation, and at once throw an abundance of water over the acid on the floor, and the carboy. When the acid is all out of the carboy, drag it out into the open air.

Never throw sawdust on nitric acid, as this greatly increases the volume of the deadly gases, and does no good. Never allow a chemical engine to be used, and never throw soda on the acid, as these generate carbonic acid, which is a heavy gas, and makes a blanket over the deadly gases, thus confining them as a rule to the room. We

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cannot emphasize too much that great care should be used against inhaling the gases generated by this acid coming in contact with organic matter, such as wood or straw. This danger is further increased because there is very little, if any, irritation caused by inhaling these fumes. This lack of irritation is, without doubt, due to the formation of nitrous oxide, or a gas commonly known as "laughing gas," which deadens the nerves of the bronchial tubes, thus permitting the irritation and poisonous gases above mentioned to be drawn into the lungs.

It is always advisable when men have to deal with the above danger to inhale weak ammonia, gas, as soon as possible, even if there is only a suspicion that they have inhaled these gases. The remedies found to be of assistance, where men have inhaled these gases, are as follows: The person affected to inhale ether, alcohol, or weak ammonia gas, as soon as possible after having breathed the fumes, even though they feel no bad affects at the time. Then administer a small glass of water every 10 minutes, into which 3 to 5 drops of chloroform have been added from a dropping tube, until recovery. The largest quantity of chloroform to be administered per day is 1.5 grains. Three drops are considered as weighing .045 grains. This prescription is to be strictly observed, and the amounts by no means exceeded. The drinking of milk, or cream, and the eating of butter, have also proven beneficial. It is, without doubt, dangerous to drink alcoholic stimulants at the time, as a remedy. The question has also been raised as to the advisability of administering oxygen to patients suffering from the poisonous fumes, excepting as a last resort.

PRECAUTIONS TO BE OBSERVED IN NITRIC ACID ACCIDENTS.

As a summary of the above, the following should be strictly observed:

Don't throw sawdust on nitric acid.

Don't throw soda on nitric acid.

Don't use a portable chemical, or chemical engine on a nitric acid fire.

Use an abundance of water to dilute the acid.

Use extreme care when entering the room, to avoid unnecessary inhaling of these gases. If possible, move in the direction in which the wind is blowing.

Inhale alcohol, ether, or weak ammonia.

Drink milk or cream.

Take chloroform internally as above prescribed. Go to bed immediately and call a physician.

In case of sodium nitrate fires, water must not be used, as this causes explosions, scattering the fire in all directions. Sand or dirt is best used for smothering fire of this description.

CHIEF CLANCY: When strong nitric acid is mixed with oil of turpentine, it sets it on fire. This is caused by the large quantity of oxygen which nitric acid contains and which enables it to burn substances, or at least makes them combine rapidly with oxygen, the heat generated often causing combustion.

An instance of a fire caused in this way occurred in the autumn of 1879, upon a railway in Baden, and Professor R. Haas of Karlsruhe was called upon by the German government to report whether the acid could produce combustion or not. In the experiment made to settle this question, the conditions which might be supposed to exist in freight cars containing nitric acid were imitated as far as possible. Small boxes, of a capacity of 10 to 16 quarts, were charged with varying proportions of hay, straw, tow and blotting paper, all of which substances are used in packing, and placed within larger boxes, while the space between them was filled with hay or tow, to prevent too rapid a radiation of heat, because the experiments were to be conducted in the open air; and the outer box at the same time represented the walls of a railway car.

The material contained in the inner box was now saturated with acid, and rather tightly compressed, so that when the cover was put on, it was pretty well filled. At first reddish, and afterwards whitish, vapors were given off; finally a distinct smoke. On lifting the cover, strongly glowing patches could be seen, which rapidly increased all through the contents, and which broke out in bright flames on access of free air, or gentle fanning. With red fuming acid, or with acid of specific gravity, 1.48, these results were obtained very rapidly and within a few minutes; with ordinary acid of specific gravity, 1.395, it required somewhat more time, and the action was less energetic in the beginning; but in three different trials, after about twenty minutes, the same result was finally obtained, provided the material was packed

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tightly in the box, and was thoroughly saturated in its successive layers.

It seems quite probable that even a weaker acid can produce the same result in larger bulk, and during warm weather, in a confined space which prevents rapid cooling. Hitherto it has often been doubted that spontaneous combustion could be caused under such circumstances, but the above experiments and results are certainly incontrovertible.

NITRIC ACID DANGERS.

If concentrated nitric acid be poured upon powdered charcoal it will take fire under ordinary temperatures. Paper, cotton, sugar, starch, and certain other organic substances treated with concentrated nitric acid, become thoroughly changed, and though in their outer form they remain the same, they become violently explosive. Warm nitric acid run into badly-annealed carboys will crack them, and set fire to the straw or other packing, or combustible material surrounding them. If this powerful oxidizing acid reaches pine wood, especially pine knots, a fire will result with frightful rapidity. Nitric acid, while contained in the carboy, is safe enough, but should it leak out into organic matter, the mixture becomes spontaneously inflammable. Like many other chemical substances it is readily affected by light, and many substances formed by its action are decomposed by exposure to sunlight, and if they be substances like nitroglycerine and guncotton, which are slightly impure, they may ignite and explode.

Cold nitric acid falling, by accident, upon a package of furs, in Medford, Mass., set the skins on fire. Strong nitric acid, if brought into contact with dry organic matter, oxidizes it rapidly and evolves heat. In many cases, fire results from such contact. This is particularly liable to occur with dry straw, sawdust, etc., so that great precautions should be taken to prevent the acid being spilled upon packing materials like those mentioned. Nitric acid is used in a very large number of industrial operations, viz., in dyeing, in the preparation of lacquers, in the manufacture of picric acid, nitrobenzol, etc., in the manufacture of many coal-tar colors, on many explosives, as guncotton, fulminate of mercury, nitroglycerine, etc.

When a carboy of acid is broken in a room, open the windows immediately to secure good ventilation and at once throw an abundance of water over the acid on the floor and the carboy. When the acid is all out of the carboy, drag it out into the open air.

MILWAUKEE FIREMEN KILLED BY NITRIC ACID FUMES.

An instance of fatal effects resulting from inhaling fumes of nitric acid occurred in Milwaukee on February 3, 1903. On the afternoon of that day the department was called to a supposed fire in a 4-story mercantile block used for the manufacture of rubber stamps, seals, dies, etc. Being the assistant chief at that time, I was one of the first to arrive and I found what resembled smoke issuing from the third and fourth floor windows. On entering the building we found that one of the employes had carelessly dropped a carboy of nitric acid from a truck, on the third floor, spilling its contents. Other employes had immediately thrown sawdust on the acid, which generated a dangerous gas. Members of the department swept up and removed the sawdust from the building and opened the windows and scuttles to ventilate same, and were not occupied in this work more than 15 or 20 minutes.

Outside of a tickling sensation in the throat and nose, we experienced no ill affects at the time. Later in the evening, however, between 15 and 20 members of the department were seized with violent congestion of the throat and lungs, while on duty in the various engine houses. A number of prominent physicians were called, but they were helpless to give any relief to those affected. Before the following morning, 4 members of the department, including Chief James Foley, had died, while several others were in an unconscious condition for a number of days and were off duty from the affects for more than three months.

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COMPULSORY SPRINKLER INSTALLATIONS

AN interesting discussion at the annual convention of the International Association of Fire Engineers, held recently in Cincinnati, was on the subject, "Would the compulsory sprinkling of all business buildings and blocks in the congested districts of a city eliminate a possible conflagration in these districts?" The paper that follows, prepared by Fire Commissioner John Grady of Boston, was read by Chief Peter F. McDonough of the Boston Fire Department, in the absence of the commissioner:

To my mind the question about which I have been asked to speak resolves itself, more or less, into that old question as to whether or not it is possible for us to make our American cities conflagration-proof. By a conflagration I mean a fire of such magnitude and intensity that firemen are unable to fight it at close range, having in mind such fires as have swept Boston, Chelsea, Portland, Salem, Baltimore and Chicago. If we are to judge the future by the past, and I can conceive of no other way of forecasting the future, I am of the opinion that our leading American cities will, from time to time, be visited by conflagrations similar to those that have aroused the citizens of this country in the past to demand fire prevention legislation. Even when steps are taken to enforce certain measures, some of the agitators are the first to cry, "Enough." It is surprising to find at times men, exponents of fire prevention, while preaching the subject to others, are anxious to suspend moderate fire regulations when the same affect their own property. I yield to no man in my conviction that fire can be controlled, but I am firm in my opinion, that before we can make any advanced strides in matters of fire prevention the public must first be convinced that the roads along which we have been traveling have been decidedly wrong. This is one great obstacle that must be met. Some method must be employed to forcibly acquaint the property owners with a few fire facts.

We shudder at the awful cost of the present world war in Europe, and let slip from our minds the fact that over $221,000,000 worth of property was destroyed by fire in this country during 1914. We cry with vengeance after tragedies similar to the *Titanic,* the *Lusitania* and the *Eastland,* yet no thought is given to the enormous toll of human life sacrificed annually to man's servant, Fire. Public attention must be focussed on the enormous sacrifice this country makes to the fire fiend. To bring these facts home to the people is one of the first steps that must be taken to make our cities conflagration-proof. When our people have been properly aroused we should then adopt and enforce stringent regulations to bring fire under human control for all time. In the minds of many, no doubt, conflagration-proof cities may be a fantasy. The compulsory erection of fireproof buildings in certain sections of our cities is a step in the right direction, but the combustible and quick-burning contents almost offset the advantages gained when a fireproof building is erected.

On December 9, 1914, fire swept through the vast establishment of Thomas A. Edison in West Orange, N. J. The value of the property destroyed was placed at $7,000,000, which represents a colossal sacrifice to fire. According to advices the fire started in a small room in a film repair building. It is the opinion of a fire protection expert that had four sprinkler heads been installed in this room they would have held the fire where it started. Absolute confidence had been placed in the structural fireproofness of the buildings, they being of reinforced concrete. It is true the walls could not burn. They remained standing, gaunt and gutted, a gruesome reminder that fireproof walls do not fireproof the contents. This is a striking illustration of the futility of trying to fireproof inflammable contents by putting them in a fireproof shell where they will burn just as coal in a stove. No one, I believe, questions the desirability of reinforced concrete as a structural material. No one doubts that it is fire re-

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sistive. No one questions its many advantages. It is a strange and tragic fact that Mr. Edison, in the late years of his life, should be faced with the tremendous task of rehabilitating his great business, a task made necessary by neglect to provide proper protection against fire for the highly inflammable contents of his buildings.

The next step, therefore, is to fireproof the contents, and the way to do that is to equip the fireproof buildings with automatic sprinklers, in which experience has taught the firemen of this country to place their faith. We all know the principle of the automatic sprinkler. It is in reality a mechanical fireman, always on the job. It never stops to think but is there to do—and does it. Every fire in its incipiency is a potential conflagration. Every conflagration thus far recorded originated in an incipient blaze. Automatic sprinklers either totally extinguish these embryo conflagrations or hold them in check until the arrival of human activity. It is not the mission of automatic sprinklers to extinguish fires, their principal function being to discover the location of the fire, send in an alarm, and hold the fire in check until the arrival of the city fire department or other outside agent. Sprinklers very seldom fail to either extinguish the fire or hold it in check until the arrival of outside aid. The number of fires reported on in sprinkler-equipped buildings from 1897 to 1915 is 16,193. Of this number, 10,326, or over 63 per cent, were entirely extinguished by sprinklers; 5,105, or over 31 per cent, were held in check until the arrival of outside agents; 762, not quite 5 per cent, showed unsatisfactory results from sprinklers. The records, in cases of unsatisfactory results, show that the failure of the sprinklers was due to the human element of carelessness or neglect, attributed principally to the water supply being shut off or insufficient, defective equipment, and unsprinklered portions of buildings.

Knowing all these things to be facts, it follows as a natural sequence that we should heartily recommend them at all times. I believe it should be compulsory that all buildings hereafter erected in the congested value districts of every city should be of fireproof construction, and such buildings should be equipped with automatic sprinklers. It should also be compulsory that all buildings, regardless of their occupancy, over 1 story in height, at present erected in the congested value district, be equipped with automatic sprinklers. In Boston we have a sprinkler law which gives the Fire Prevention Commissioner for the Metropolitan district authority to order the installation of sprinklers in any building used in whole or in part for the business of woodworking, or for the business of manufacturing or working upon wooden, basket, rattan or cane goods, or articles, or tow, shavings, excelsior, oakum, rope, twine, string, thread, bagging, paper, paper stock, cardboard, rags, cotton or linen, or cotton or linen garments or goods, or rubber, feathers, paint, grease, soap, oil, varnish, petroleum or any of its products, or other inflammable fluids, and any building used in whole or in part for the business of keeping or storing any such goods or articles.

Sprinklers can be ordered in buildings coming within the foregoing classes only when four or more people live or are regularly employed above the second floor. The law was just a year old on the first of this month, but it has been in practice only about six or eight months. In that time it has met with remarkable success. Up to August 1 of this year, approximately 185 buildings have been equipped with automatic sprinklers, and 37 buildings are now in the process of being equipped. These figures do not include the number of buildings already equipped with sprinklers previous to the passage of the law. Like many other laws on our statute books, experience has taught us its drawbacks, and among the drawbacks in this law is the restriction that more than four people must live or be employed above the second floor. This provision practically excepts large storehouses and warehouses, where employes only go above the second floor when transferring merchandise, which is generally of highly combustible nature. Later on, no doubt, we will have a more stringent law—one that will make the in-

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stallation of sprinklers compulsory in every business building or block. Then will our cities gradually become conflagration-proof so far as is possible to make them with human ingenuity and inventiveness. Each building equipped with sprinklers reduces by one the conflagration breeders in our cities. However, we must allow for slight defects in the system. The water supply may be shut off, corrosion may have set in, or some other defect may exist which will affect the efficiency of the sprinklers at the crucial moment. Allowing for these defects, it is safe to say that when all the buildings in the congested value districts are equipped with sprinklers, those districts will be 97 per cent safe from the possibility of a conflagration. In other words, a conflagration in the congested value districts would be remotely possible, but not probable.

I do not attempt to say that such protection would eliminate the possibility of a conflagration entering the district. A conflagration might start in the wooden section of the city, as they have started, and move into the business district. The effect of automatic sprinklers then would be a theory. I do not believe that sprinklers would stop a conflagration of the nature and magnitude of the Portland, Chicago, Chelsea and Salem fires. These fires started in the outskirts and swept into the city proper. Many things may happen during a conflagration that upset the calculations of theorists. When from 50 to 100 or more steam fire engines are drawing water from the mains, the water service is affected and the efficiency of the sprinklers retarded. Even if the sprinklers are fed from a separate service they are drawing from a source already overtaxed. If the use of dynamite is necessary to check the spread of the conflagration the water mains are more than likely to be damaged. The particular asset of sprinklers is an efficient water supply at all times, and when this is removed or diminished the efficiency of the sprinklers would be seriously affected. I do not think that a conflagration would be extinguished or checked, although there is a possibility of its being retarded, by blocks of buildings equipped with automatic sprinklers.

Today "preparedness" has grown to be the watchword in every line of human endeavor. Talk of preparedness in national affairs is heard on all sides. It is rumored that plans are being prepared to spend $445,000,000 in bringing our army and navy up to a certain standard. Men marvel at such a vast outlay of money, and still the country is burning up at that rate biennially. Preparedness should be the issue in the business world.

In times of peace and prosperity men should prepare and protect against the ravages and inroads of fire as they would against the invasion and onslaught of a natural enemy.

THE RAT AND THE LIVE WIRE

The origin of many mysterious fires, due to "defective wiring," may be traced to the rat, and the photograph on the front cover of this number of SAFETY ENGINEERING can be regarded as Exhibit A to prove the culprit's guilt. This picture was taken by order of a telephone company in the Northwest, after complaints of interrupted service had caused a search to be made for the trouble. The body of a partially charred rodent, which had gnawed the wires and formed a short circuit was discovered, and from the peculiar arch of the tail, it was evident that he had been electrocuted. Fortunately the telephone wires did not carry a voltage sufficient to cause much trouble; if the electric light wires had been selected by the rat there would have been another unaccountable conflagration, due to "defective wiring." The solution would seem to be a rat-proof insulation, which an expert should be able to suggest readily, and put into the market at slight expense. A coating which would be poisonous to rats or repellent to them, would answer as well as an insulation too hard to be gnawed. Incidentally the dangerous rat should be fought as part of the "Safety First" campaign, not only on this ground, but because it is a spreader of disease, a destroyer of merchandise and a cause of fires when it finds live wires and rubbish in juxtaposition.

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EMERGENCY SERVICE TRUCK

One of the great water mains in Boston is of such capacity that if broken it would permit the escape of 50,000 gallons of water a minute, and the closing of the 36-inch gate valves which shut off the flow would require the steady work of four men, turning the gate wrench for three-quarters of an hour. It is easy to imagine that during this 45 minutes, very serious damage could be done, especially in case of fire, and in order to eliminate the danger and delay, a device has been installed to do this work by the engine of a motor truck, which carries the device and a crew of operators to the scene of emergency in the shortest possible time. By its use the work that would require a gang of four men to work 45 minutes can be done easily in 10 minutes, making 307 turns of the gate wrench to completely close the valves.

The truck which carries this apparatus responds to fire alarms with the regular equipment, prepared to regulate the flow of water as required, and is always in readiness to control the water outflow in case of damaged mains, as it carries crews for both day and night service. It sometimes happened, when the work was done by hand, that calls overlapped and that the emergency work was delayed, resulting in loss of money and the risk of lives; also the crews would return to their quarters absolutely exhausted from the stress of hard, swift work; with the speedy truck and the efficient gate-closing mechanism, the loss of time and the excessive labor are done away with.

George H. Finneran of the Boston water department invented the device. which is carried on a White truck with specially designed body. It is shown in the photograph, just below the driver's seat, an aluminum housing containing a universal wrench socket and operated by a worm gear driven by the engine of the truck. It is conveniently arranged to bring the device over the manhole of the water gate and to adjust a wrench in position between the appliance and the gate nut. A universal joint on the wrench allows for a slight divergence from the exact alignment. A lever operated by the driver throws the power upon the mechanism, the forward trans-

1500-Lb. Emergency Service Truck Attached to Boston Water Department.

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mission of the engine being used for the purpose of closing the gates, and the reverse for opening them. The gates are provided with indicators showing the position of the valve and telling the operator when the valves are entirely open or completely closed. Where this device is not used, a counter is attached to the wrench to register the number of turns, so the correct number can be given to each valve, and finally as a safety measure, a pin is placed in the universal joint of the wrench which will break in case of the valve seating unexpectedly and forcibly, thus disconnecting the power and preventing injury to the valve or main or to the mechanism of the gate-closing appliance.

CHEMICAL MOTOR FIRE CAR

It is during the incipiency of a fire that extinguishing facilities are most needed. The difficulty usually is to get extinguishing material to the fire in ample time to prevent its spreading. The accompanying illustration shows the construction of a tri-car chemical engine which possesses the advantage of being small, speedy and easily handled, and it is claimed further that it will get on the job easier and quicker than any piece of known efficient fire apparatus.

The engine consists of a 35-gallon chemical tank, supported on a truck designed to a speed of 45 miles an hour with absolute safety. It has the advantage of a very low first cost and low maintenance cost which makes it possible to add it to established stations as well as new stations with little additional expense. In cities with large suburban tracts it offers better protection than does the usual fire engine.

In addition to the 35-gallon chemical tank, it carries 200 feet of ¾-inch F. D. chemical hose and also 2 F. F. 3-gallon hand extinguishers.

The power is supplied from a twin cylinder engine with two speeds. It will climb practically any hill and starts and stops easily and developes fourteen horse power at 45 miles an hour on high gear.

A Tri-Car Motor Chemical Engine.

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WEST SHORE ELEVATOR EXPLOSION

IN a grain elevator at pier No. 7, Weehawken, N. J., owned by the West Shore Railroad, a terrific explosion occurred on July 15. The explosion was followed by a fire, but the property loss was not large. There was no loss of life, although one man's leg was fractured and several persons sustained cuts and bruises from the falling walls. From a report by the Bureau of Surveys of the New York Fire Underwriters, the details below are taken.

Construction.—Seven-story and 1-story and basement, the 1-story section where storage bins are located equal in height to six floors. Building of incombustible material but not fireproof. Walls brick. Parapets none. Partitions few around small offices, 4-inch tile and metal on wood studs. Cornice metal. Skylights none. Roof composition gravel covered on 4-inch tile, on supports similar to floors. Fireproofing none except interior columns from first to bottom of storage bins protected by 3 and 4-inch tile, also exterior columns on side walls of cupola section protected by 3-inch tile. Ceilings open. Floor Openings—One open iron stairs and one open elevator in brick fire tower with flat frame iron doors to floors; four open stairs, also pulley openings, etc., between floors; one circular iron stairs enclosed in metal on east wall with flat frame iron doors at openings and extends to bin floor only. Ship bucket conveyor enclosed in metal tower on south wall and extends to level of top of upper bins.

Exposures.—North and South thin glass windows in metal sash frames, some in lower section of building protected by flat frame iron shutters, overlooking boat basins. Eave sprinklers along cornices of lower and cupola sections on north side. East thin glass windows in metal sash frames, some in lower section of building protected by flat frame iron shutters, overlooking wood pier. West thin glass windows in metal sash frames, some in lower section of building protected by flat frame iron shutters, 20 and 30 feet to small 1-story wood building used as carpenter shop.

Hazards.—Power, electric motors for machinery and elevator. All motors are enclosed and of the induction type. Heating, none except small electric radiators set up in offices and locker rooms in extremely cold weather. Lighting, electricity only; incandescent globes are on drop cords and most without guards. Lubricating oil, 1 barrel ordered at a time and placed in small iron tanks with spigots at bottoms.

Protection.—Inside—50 feet of Eureka 2½-inch C. R. L. hose at each outlet as follows: First, 14, gallery floor, scale floor and top floor, 4 each, garner floor 8; standpipes are reduced in diameter at each floor and vary from 6 inches to 2½ inches; supplied by an 8-inch line, from 12-14 and 16-inch private high pressure system 125 pounds pressure, controlled by a gate valve 70 feet from west side of elevator and also available from 4-way hose connection for fire boats near end of pier.

Alarm Service—Local fire alarm with break-the-glass boxes and bells each floor. One watchman makes four rounds, with Newman's labeled clock, visiting thirteen stations, nights, Sundays and holidays.

Outside—Eave sprinklers at the top of north side of main and cupola sections supplied through two 5-inch risers with gate valves on first floor; sprinklers are supplied by 6-inch line from 12-14 and 16-inch high pressure main with post indicator gate valve located 70 feet from west front of building. Eave sprinklers are also supplied from 4-way connection for fire boats near end of pier. Fire tower. Public—Fire boats only available.

How Discovered.—At 11 a. m. a flash and a terrific noise, described as a very sharp flash of lightning and crash of thunder, occurred on the bin floor. The concussion was felt on the upper floors of the cupola. The explosion seemed to come from the south central portion of the bin floor. The tops of five bins in this immediate vicinity were blown off. One of the shipping bins (No. 107) showed considerable charred grain dust,

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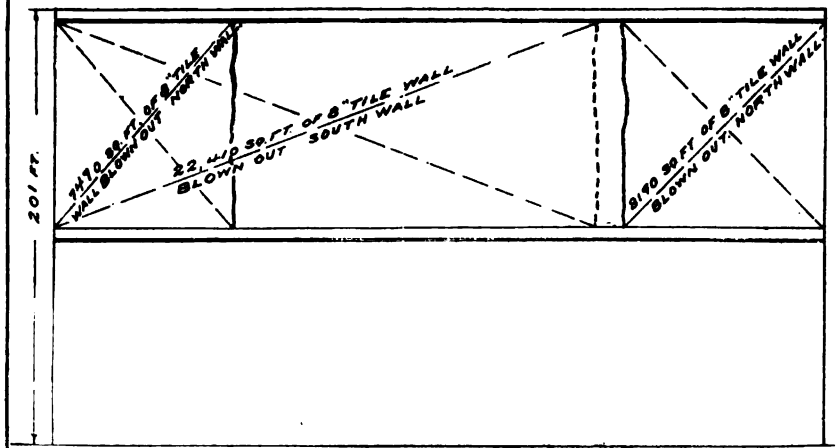
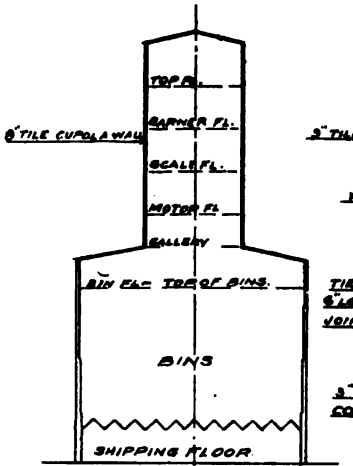
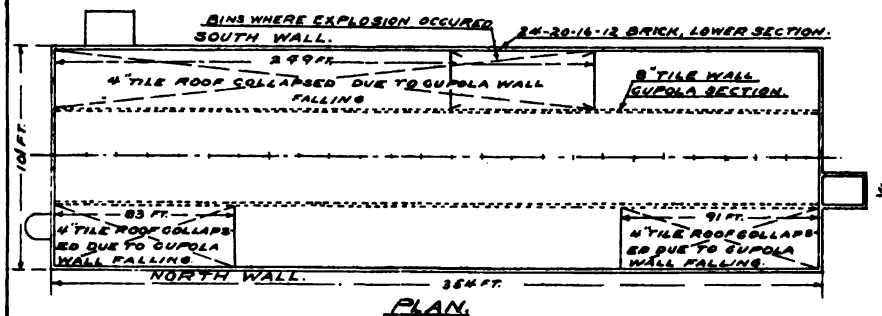

201 FT.
1440 SQ FT OF 8" TILE WALL BLOWN OUT NORTH WALL
2210 SQ FT OF 8" TILE WALL BLOWN OUT SOUTH WALL
2190 SQ FT OF 8" TILE WALL BLOWN OUT NORTH WALL

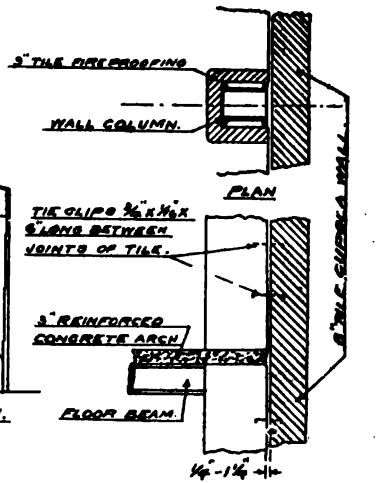
SIDE ELEVATION.



END ELEVATION.


BINS WHERE EXPLOSION OCCURED
SOUTH WALL.
24-20-16-12 BRICK, LOWER SECTION.
299 FT.
4" TILE ROOF COLLAPSED DUE TO CUPOLA WALL FALLING
8" TILE WALL CUPOLA SECTION.
101 FT.
83 FT.
4" TILE ROOF COLLAPSED DUE TO CUPOLA WALL FALLING.
91 FT.
4" TILE ROOF COLLAPSED DUE TO CUPOLA WALL FALLING.
NORTH WALL.
354 FT.

PLAN.



DETAIL SHOWING 1/4" TO 1 1/4" SPACE BETWEEN CUPOLA WALLS AND BALANCE OF BUILDING.

WEST SHORE GRAIN ELEVATOR
PIER NO. 7 WEEHAWKEN N.J.
SHOWING LOCATION OF ROOF AND CUPOLA WALL FAILURES.
EXPLOSION OF JULY 15, 1918.

JULY 29, 1918

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which is stuck to the metal sides of the bin. The adjoining bins (Nos. 10 and 12) had some charred grain dust near the tops. The tops or covers of the bins are constructed of 3-inch reinforced concrete flat arches. Each bin has a hole at the top and bottom through which the grain passes and the top hole is used at times as a manhole.

Origin.—Unknown. The explosion might have occurred from grain dust, but it is claimed that bin No. 107 was empty at time of the explosion and adjoining bins (Nos. 10 and 12) were only half filled with grain, also that these bins had not been worked on for at least a day or more before the explosion happened. It is also claimed that no employe had lowered an electric light to examine bins prior to the explosion. There is no machinery or electric wiring in any of these bins as the grain is removed by gravity.

Damage.—After the explosion some of the light grain dust on the bin floor caught fire which was readily extinguished by members of the fire brigade in the building with the use of two hose lines. The damage was mainly in the cupola section. The tops of five shipping bins, constructed of 3-inch reinforced floor arches were blown off, comprising an area of about 1,800 square feet. The cupola side walls are constructed of 8-inch tile, the bottom of the wall resting on an unprotected steel girder at the level of the gallery floor. These walls are not bonded or tied into the structure of the building except by small ¾ x 1/16-inch clips about 6 inches long, which are set between some of the joints of the wall and the 3-inch fireproofing around the columns just inside the wall. This construction makes each cupola side wall practically one panel. There is a distance of from ¼ to 1¼ inch space between the side walls and the fireproofing around the columns; there is a similar space at the floors. A large portion of the south wall at the eastern end (22,410 square feet) was blown down and two portions of the north wall at the eastern and western ends (7,420 and 8,190 square feet, respectively) were blown down. The 4-inch tile roof over the elevator bins, supported on light angle irons, was crushed in, due to the cupola side walls falling; also the tops of two bins at the northwest corner were crushed in, as the roof supports directly over these bins were ripped from their riveting, making a direct opening for the tile to fall on the top of the bins. There seems to be no damage to the steel framing of the building except the roof beams over the bin portion mentioned above. A part of the south side wall (about 200 square feet) of the main building immediately in front of the bins where the explosion started was cracked near the top and had to be taken down as the mortar between the brick was in poor condition.

Property Loss.—Other than the damage to the building walls and roofs there was no loss, as the dust on the bin floor which caught fire was extinguished within five minutes.

Conclusions.—The origin of this explosion is not satisfactorily explained, as the bins in the immediate vicinity where the explosion seemed to originate had not been used nor had any employe occasion to go down into or look into the bins for at least twenty-four hours before the explosion occurred. It is not customary in this elevator for employes to lower lights to examine the height of grain in bins, as this height is known by the weight measurements on the scale floor.

According to information obtainable, the elevator was kept fairly clean of dust accumulations. The blower system, however, with floor sweep-up connections on cupola floors for removing dust, is reported to have been out of use for some time. It is claimed that the dust was swept up by hand and placed in barrels or similar containers and taken down on the elevator. Under these conditions, cleaners might at times have been tempted to sweep the dust into the manholes at the tops of the bins. It has been suggested that vacuum cleaning systems be adapted for use in removing dust accumulations from grain elevators, thus reducing the hazard due to mixing the dust with air incidental to sweeping it out manually.

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TESTING FIREPROOFED SCENERY

A UNIFORM method for fire-proofing and testing scenery, curtains, drops, etc., in theaters and assembly halls is favored by all chiefs of fire departments, Chief H. C. Bunker of the Cincinnati fire department said, in addressing the International Asociation of Fire Engineers.

INFLAMMABLE MATERIALS CAUSE FIRES AND PANICS.

"The flimsy and inflammable nature of the materials and the terrible results of fire in theaters, where in such cases there invariably ensues what is almost worse than fire, a panic, the awful experiences of some of our cities in recent years, have made all of us, I think, sufficiently alive to the importance and necessity of testing and fire-proofing scenery.

"Some of our experiences in Cincinnati may be of interest. When we started the systematic testing of scenery several years ago, there were in Cincinnati 19 regular theaters and 69 moving picture houses. All these, with the exception of a few regular houses, had no fire protection whatever in the way of extinguishers, pikepoles, axes, barrels of water, or fire buckets. Fireproofing was unknown to some of the managers and owners of theaters. The work of inspecting, however, proved to many of these managers that the sanitary condition improved with the necessary fire protection. Dust had accumulated in the rigging lofts of some of the theaters from the time that they had been built. The removal of all dust from the rigging lofts and the cellarways was ordered, and all unprotected woodwork in the rigging lofts and cellarways of all regular theaters and moving picture houses was ordered fireproofed. The result at the end of the year was that in all these theaters and picture houses there was installed the necessary equipment for fire protection, and they had fireproofed all unprotected woodwork. During the year 14,000 pieces of scenery belonging to shows entering the city for a week's run were fireproofed and tested.

"The efficiency of fireproofing was demonstrated on several occasions—once at an evening performance of one of the leading houses, when a piece of scenery was charred by crossed electric wires. It was agreed by all who saw this charred piece of scenery that if it were not for the fact that the scenery in the house had been fireproofed that day a serious fire would have resulted. On another occasion, at an evening performance in a moving picture house, a piece of defective electric wiring charred the woodwork in a remote part of the cellar, but without starting a blaze, owing to the fact that the woodwork had all been fireproofed ten days previously.

CINCINNATI METHODS.

Part of the plan we have adopted is to give theaters a thorough inspection before the season opens, to see that all house scenery is fireproofed and that the fire hose, standpipes and all fire extinguishers are in good working condition. By inspecting we have discovered hundreds of pieces of scenery stored in the fly galleries that had become covered with dust. By ordering them to be tested often the managers, rather than submit to a test, have had them taken out of the theaters and stored elsewhere, thus eliminating a serious fire hazard. Our test of theatrical scenery run from 3,000 to 3,500 pieces per month, about one third of which stand the ordeal.

"These have been among the chief results of our work and fairly show the necessity and importance of inspecting and testing. However, the main point I wish to urge on this association is the advisability of adopting a uniform and standard test by the fire departments of all our cities for use on scenery, and especially on theatrical scenery and equipment, since theatrical scenery to a much greater extent than that used in concert halls and moving picture houses is on the move from place to place, and conse-

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quently subject in each place to tests that vary much in kind and severity.

"There are two chief methods of testing—the match and the blowtorch. In Cincinnati we use a 3-inch gasoline blowtorch, and we find it by far the most satisfactory for the reason that it can be applied to flat surfaces and other parts of the scenery where a mere flame or match test would prove utterly inadequate.

"Now you can readily see what confusion and trouble are brought about when scenery which has successfully passed a less severe, or at any rate a different, test in another city reaches Cincinnati and is not allowed to go on without refireproofing.

"One good method, perhaps, would be for the fire chiefs throughout the country to have an official stamp, to be placed on scenery which had successfully stood the blowtorch or some other standard test to be agreed on—the stamp to show the date and place of testing."

FIRE DEPARTMENT ORGANIZATION IN INDUSTRIAL PLANTS

By H. V. Holmes, Fire Marshal, Sears, Roebuck & Co., Chicago.

THE organization of fire brigades to protect private plants has been given more attention of late years than ever before. Members of these brigades, by frequent, prescribed drills at unexpected times, followed by practical talks on duties, causes of fires, conditions to avoid in the plant and in their homes, have a decided bearing on the reduction of fire losses. Inasmuch as members are to serve as "first aid" in handling a fire before the arrival of the city department, they should work under orders of the first officer responding from the city department. As there is no sharp dividing line between fire extinguishment and fire prevention, I beg to state, that by far the greatest part of our efforts are directed to fighting fires before they start. A brief description of the department which the writer has organized in our Chicago plant, follows:

Each floor has its own company of 26 members, consisting of captain, 2 lieutenants, 6 pipemen, 6 fire-door men, 3 valvemen, 3 fire-escape and stairway guards, 2 chemical-extinguisher men, 1 axeman with Pyrene extinguisher, and 2 men with tarpaulins. There are 24 companies in the plant during the regular working hours These companies are drilled bi-weekly at unexpected times. At night the fire protection is taken care of by a detail of night watchmen, who are divided into two companies of 9 men each. One company is on duty in a squad room while the other is pulling boxes throughout the plant. These companies change watches at midnight. In order to make a quick response to alarms, the fire department is provided with an automobile hose wagon of the regulation type, fully equipped with hose, tarpaulins, basement pipe, deluge set and smoke helmets. This automobile is stationed in a hose house directly in the rear of the fire marshal's residence which is located opposite the center of the plant.

These firemen are drilled frequently, at unexpected times, of course, and at all hours of the night. The drills, with some slight modifications, follow out the rules of the fire college of the New York fire department.

The plant is equipped with a Gamewell fire alarm system, alarms being received in the fire marshal's office from where they are automatically transmitted to watchman's dormitory, hose house, and fire marshal's residence. The sprinkler system for this plant is entirely supervised by the American District Telegraph supervisory service, the register in the fire marshal's office recording waterflow signals at the same time they are received at the supervisory office. The main source of water supply is from a 36-inch low pressure city main, we be-

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ing the first consumer, as the city pumping station, with a capacity of 100,000,000 gallons every 24 hours, is our nearest neighbor.

We have three 1,000-gallon Knowles Underwriters pumps equipped with Foster automatic governors, with a constant water pressure of 125 pounds. Three steel gravity tanks, with a combined capacity of 180,000 gallons, located in a fireproof tower, 30 feet above the highest row of sprinklers, cut in automatically in case the pump pressure (through an accident) drops below 75 pounds gravity pressure. Steamer connections are so arranged that by pumping into any of the siamese connections, any one of the 43,000 sprinkler heads, comprising the entire equipment, can be reached.

Safeguarding the Chicago plant and warehouses requires a force of 65 night watchmen, reporting rounds to a central station, operated by the American District Telegraph Company. Rounds are completed in 45 minutes, watchmen working in two shifts changing at midnight. Men off their beats are held in reserve as an auxiliary to the regular fire companies. Inspections are carried on constantly, the rules and requirements of the National Board of Fire Underwriters, rules of the Bureau of Fire Prevention and Public Safety, City of Chicago, and the very complete suggestions contained in "Field Practice," Inspection Manual of the National Fire Protection Association, being our guides. In this connection our department has been greatly benefited by periodical visits through nearly all our different plants, of the engineers of the Independent Inspection Bureau of Philadelphia. This department believes that fire prevention is entirely a matter of education, and to this end, talks are given employes from time to time, as well as to members of the fire companies, on this important subject.

To safeguard private institutions, one of the most important points is that of watchman. These men are virtually in charge of the plant for the majority of the 24 hours, throughout the year, and great care should be exercised in their selection. A watchman should be active, alert, of middle age, one who will take an interest in his duties, and should, of course, be paid for services rendered. He should have at least two nights off each month; in fact the position should be made such that only the very best of men can qualify. A great many employers expect one man to perform watchman's duties for 12 or 14 hours out of the 24. No man, whether he be old or young, can satisfactorily "deliver the goods" for a long period of hours. The writer believes it would be a good thing if the watchmen were under the supervision of the chief of the fire department. Then the chief or his assistants could occasionally visit the watchmen, and instruct them in their duties. This would greatly lessen the fire losses in our respective communities.

Watchmen should make nightly reports showing conditions of the property under their charge; whether rubbish has been removed from building; oily waste taken to boiler room and burned by day employes; windows properly closed and intact; packing material properly safeguarded and all private fire apparatus in its place and ready for use. These reports should show pressure on sprinkler risers; pressure tanks; pressure on dry system; height of water in gravity tank, and condition of fire pump. The report should be turned over to the superintendent or whoever is in authority, and an effort made to rectify mistakes immediately. The watchman should know how to handle controlling valves on the sprinkler system; how to set dry valves; how to pump up gravity and pressure tanks and pressure on dry systems.

Watchman service should be maintained at all times when the plant is not in operation, and the record of such service be shown on such mechanical device as will not permit of the evasion of duty. Records should be checked over, filed and dated each day.

More than 60 per cent of the foreigners employed in the steel mills in Pittsburgh worked on farms before coming to America, and the dangers of the trade are unknown to them.—*H. H. Wheaton.*

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CHEMICAL EXTINGUISHERS

Nowhere in commercial life is the operation of supply and demand inactive. Supply may not always create a demand, nor can demand always be relied upon to produce a supply. Two score years have passed since Professor James F. Babcock of New York brought out the first horse-drawn chemical wagon.

The chemical engineer, with the mechanical engineer, has made chemical fire apparatus one of the most efficient fire extinguishing devices in use at the present time. The term "combination," in its application to fire apparatus, was made use of for the first time about 35 years ago, when James R. Hopkins, former head of the fire department at Somerville, Mass., reconstructed an old hose reel, placing a chemical tank on it. It proved its efficiency from the start, and since then chemicals have been increasing in use for fire-extinguishing purposes, and today a piece of fire apparatus without a chemical tank would not appeal to a well-posted prospective buyer.

Information gathered from reports of fires warrants the estimate that fully 75 per cent of fires are extinguished by chemicals, without the use of water. The latest pattern of triple combination apparatus is a veritable fire department in itself.

"MENACE TO HUMAN LIFE"

The Committee on Public Information of the National Fire Protection Association has issued a bulletin calling attention to this advertisement which appeared in the *Pittsburgh Press* of August 13:

Says Any Woman Can Dry-Clean

Put Gasoline and Solvite in a Wash Boiler and Save Five Dollars.

Pittsburgh ladies will never again pay enormous prices for dry cleaning after trying this. Any woman can clean and renew the appearance of yokes, ribbons, satins, laces, silks, furs, shirtwaists, swiss, lawn, organdy and chiffon dresses, kid gloves and shoes, neckties, children's clothes, suits, caps, woolen garments, fancy vests, draperies, rugs, in fact, any and everything that would be ruined with soap and water. Get 2 ounces of Solvite at any drug store and put it in 2 gallons of gasoline, where it quickly dissolves. Then put in the goods to be cleaned. After a little rubbing, out they come looking bright and fresh as new. You will find nothing fades, shrinks or wrinkles, requiring no pressing. You would have to pay $5 at a dry-cleaning establishment for the cleaning which can be done at home as easily as laundering. Any grocer or garage will supply the gasoline and your druggist will furnish the Solvite, which is simply a gasoline soap. Then a large dishpan or wash boiler completes your dry-cleaning outfit.

It may be assumed, the National Fire Protection Association Committee says, that the people paying for this advertisement are making a drive for business with newspapers willing to accept mischievous advertisements of this sort in at least all of the soft coal consuming territory where the demand for dry-cleaning is greater than in cleaner localities. The menace to human life involved in such reckless use of gasoline by those who are unfamiliar with its dangers should furnish a motive to those in authority for the taking of drastic measures to discourage a propaganda of this character.

INFLAMMABLE LIQUIDS

A resolution adopted unanimously by the Fire Prevention Committee of the Safety First Federation of America at a meeting held on August 19, 1915, in New York City, reads:

RESOLVED: That Representative Biggerstaff of Kalamazoo, Mich., be thanked for his efforts in the recent session of the Michigan Legislature in behalf of "A bill to regulate the use, handling, storage and sale of inflammable liquids and the products thereof, and providing penalties for violation thereof," and that Representative Clark of Lebanon, Ohio, be also thanked for his efforts in the recent session of the Ohio Legislature in behalf of a similar bill; and that State Fire Marshal Winship and Assistant Fire Marshal Robinson of Michigan be commended for the new regulation governing combustibles, explosives, etc., in the State of Michigan and the executive secretary is hereby directed to send copies of this resolution to Messrs. Biggerstaff, Clark, Winship and Robinson.

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FIRE DEPARTMENT WORK IN FIRE PREVENTION

By J. C. McDonnell, Chief, Bureau of Fire Prevention and Public Safety, Chicago.

THE intelligence of the average fireman, be he officer or private, fully justifies a confidence in his ability to perform efficient inspection work, especially if he has the advantage of contact and experience with technically trained men. One will find the average fireman fully competent to inspect and return an intelligent report on any ordinary matter constituting common subjects for inspection and requiring correction, such as fire escapes and buildings and conditions requiring them; storage of motion picture films; storage of acids; regulations for aisles and exits in the various classes of buildings; safe installation of boilers and furnaces, their breechings, flues, etc.; handling of explosives, storage of ammunition, blasting, necessary isolation, thaw-houses, etc.; safe installation of kitchen ranges, candy furnaces, organizing and conducting fire drills, and dangerous accumulation of rubbish and waste matter of an inflammable nature or subject to spontaneous ignition. The practical fireman of average intelligence, because of his experience and natural intuition, is especially zealous and inspired to the correction of the conditions which cause our conflagrations, holocausts, calamities and contribute to the national fire waste. But, in order to make the firemen especially proficient (not alone in the ordinary everyday work of commonplace corrections), that they may be inspired to study the finer and more intricate phases of fire prevention engineering, it is essential, especially in the larger cities, that men of technical training be associated with them. Such men of technical knowledge and training are necessary in dealing with the installation of automatic sprinkler equipments and inside standpipes, their pumping units and sources of supply. They will be found necessary as consulting engineers, for instance, in the installation and maintenance of cyclone dust collectors, theater fire curtains, in japanning and enameling plants, the installation of gasoline pumps, charging stations and oil separating systems in garages; the safe installation and maintenance of dry cleaning plants, the installation of local fire alarm systems, in dealing with calcium carbide, acetylene gas, likewise the many devices in which gas is used for fuel or heat. Technically trained and experienced men are needed in connection with many tests necessary to be made from time to time in the work of fire prevention, and I have found that good, conscientious cooperation between the technical men and the uniformed force can be had.

Inspection of properties and correction of defective conditions found therein are not always pleasant duties. Some of our citizens entertain a rather overgrown but erroneous idea of their personal liberty. That spirit will be found to prevail very strongly, but not exclusively, amongst those of foreign origin. They are apt to resent any suggestions, notices or measures for the safeguarding and protection of their own or their neighbors' property, or the lives of their families or their neighbors, as an unwarranted governmental interference with their property rights. For those reasons, and with those obstacles to be encountered, it is quite necessary for fire prevention inspectors to be conservative, patient, prudent and diplomatic. To that end it is very necessary that men drafted or assigned from the rank and file of a fire department to inspection duty should be given considerable attention. They should be taught, trained and lectured to. It is vitally essential that all who are engaged in the service should have access to and read magazines and publications devoted to the subject matter. It is especially so es-

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sential to firemen engaged in, or expecting to be engaged in, the work of fire prevention inspection.

It is essential to effective results in fire prevention inspection to have either ordinance or statute upon which to base authority for corrections. But in the absence or pending the passage or enactment of such laws, I would say to the chiefs of fire departments organize and launch into operation some form of fire prevention inspection, with or without legal authority; go on record and you will be amazed to note how the tide of public sentiment in your community will flow to you. If you have no well defined, comprehensive legislation, recommend it, and if your recommendations are rejected or disregarded, re-recommend them, thereby placing the responsibility and the sin of criminal negligence on the conscience of the powers that be. If I am not sadly mistaken you will very readily get relief. You will at least have the comfort of relieving yourself of an undesirable responsibility.

To be effective, the inspections and written notices for correction of fire departments must be recorded and copied. You must have a thorough and comprehensive filing, follow-up, card and check-up system. If your notice asks to correct within a limited time, be it 24 hours or 30 days, your check-up inspector must be there exactly at the expiration of the time specified if you wish to impress the party notified that you mean business. Likewise, if you grant a continuance, you must have the matter checked up at the expiration of the continuance. In other words, once you discover and make a record of a violation or dangerous condition, you must neither let up nor waive until you obtain a correction.

Fire Prevention by fire departments is old in principle but new in many of its modern methods and phases. The preventionists of old, the fire wardens, the men and the boys of the bucket brigades, and of the venerable old breakdown machine, knew not or dreamed not of the virtues of the automatic sprinkler, had no use for the inside standpipe; the benzine cleaning plant was to them unknown, the garage and the gasoline machine were unheard of, and the gasoline or acetylene lights were not their contention. High explosives were but in remote use. Sky-scrapers, cellars and many tiers of subcelllars were not even suggested in their time. It is up to and it is the duty of the fire chief, the fire engineer of this age, to adopt the new order of things. It is his duty to organize a fire prevention movement within his department, to lend to it his full and sincere co-operation, to secure for it the necessary legislation, to obtain for it an appropriation commensurate with its needs. It is his duty, not only as a fire-fighter and a fire chief, but as well his sacred duty as an American citizen to exert every influence, power and prestige he may possess, toward the propaganda of fire prevention, and the redemption of our country from the blight of fire waste and needless sacrifice of human lives.

NEW PORTABLE FIRE ESCAPE

Pietro Vescovi, an Italian inventor of Tacoma, has invented a new fire escape which can be carried in the pocket, the suit case, or hung up on a tack on the hotel bedroom dresser.

The apparatus consists of a steel tape wound on a reel. Unwinding is governed by a small though efficient brake. The inventor has demonstrated by actual test that he can stop the unwinding reel with a human body on it, and thus lower the body slowly or rapidly as the one descending may desire.

The tape is capable of carrying 1,500 pounds of weight. The inventor has lately drawn crowds in Seattle and Tacoma by lowering himself from the tops of the highest buildings to the sidewalks, much as flying machine inventors used to draw spectators at their tests and experiments in the back lots.

Vescovi has lowered himself from 14-story buildings with perfect safety. Sometimes he would shoot earthward at a violent speed only to bring himself to a gentle stop by manipulating the brake on his invention. Lodging houses equipped with this invention should not be a menace.

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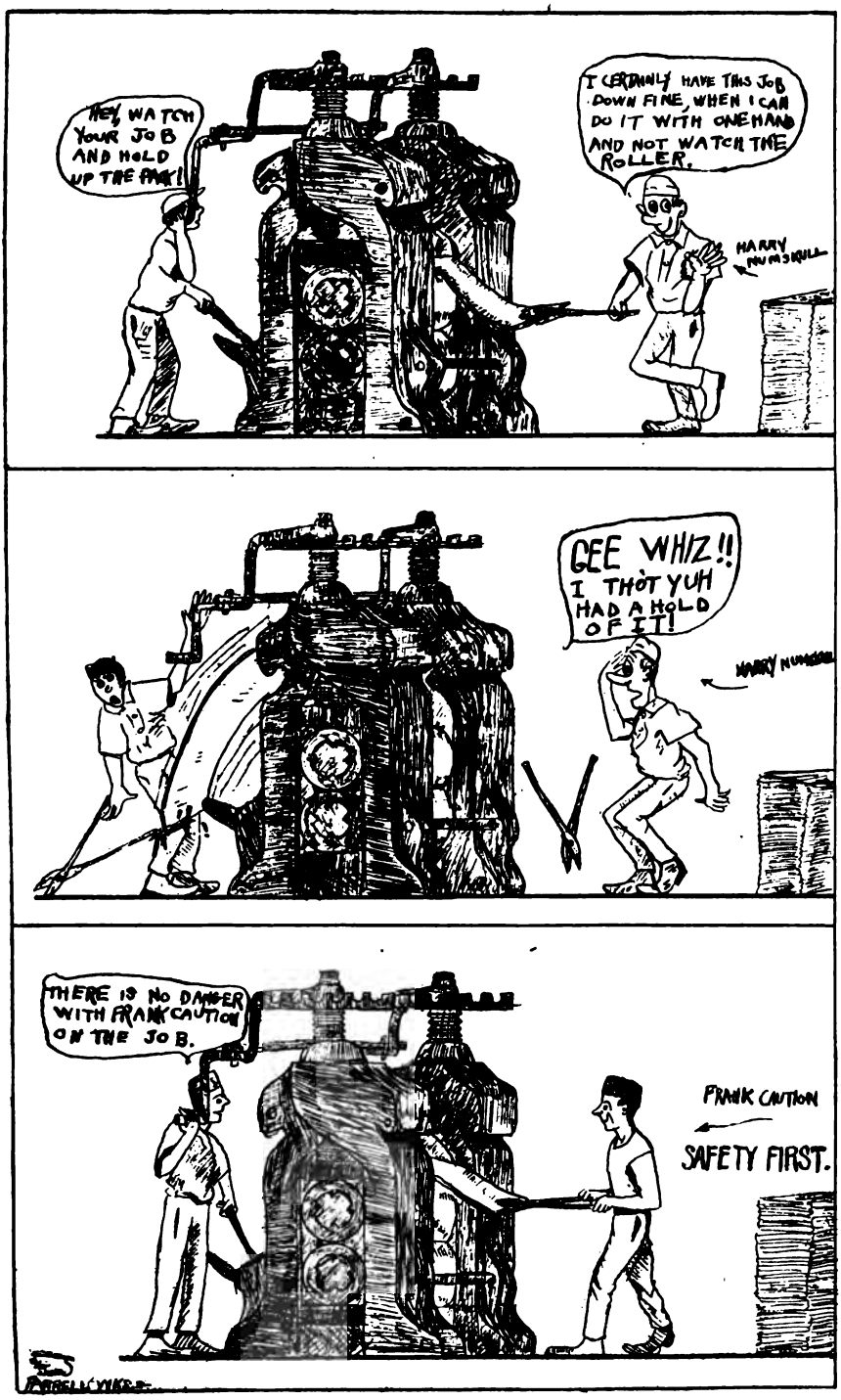
HARRY NUMSKULL AND FRANK CAUTION


HEY, WATCH YOUR JOB AND HOLD UP THE PAN!
I CERTAINLY HAVE THIS JOB DOWN FINE, WHEN I CAN DO IT WITH ONE HAND AND NOT WATCH THE ROLLER.
HARRY NUMSKULL
GEE WHIZ!! I THOT YUH HAD A HOLD OF IT!
THERE IS NO DANGER WITH FRANK CAUTION ON THE JOB.
FRANK CAUTION
SAFETY FIRST.

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EDITORIAL

Automatic Sprinklers and the Public

ADDRESSING the annual convention of the International Association of Fire Engineers, in Cincinnati, a few weeks ago, on the compulsory installation of automatic sprinklers to save life and property and to prevent conflagrations, Fire Commissioner Grady of Boston said: "In Boston we have a sprinkler law which gives the Fire Prevention Commissioner for the Metropolitan district authority to order the installation of sprinklers in any building used in whole or in part for the business of woodworking, or for the business of manufacturing or working upon wooden, basket, rattan or cane goods, or articles, or tow, shavings, excelsior, oakum, rope, twine, string, thread, bagging, paper, paper stock, cardboard, rags, cotton or linen, or cotton or linen garments or goods, or rubber, feathers, paint, grease, soap, oil, varnish, petroleum or any of its products, or other inflammable fluids, and any buildings used in whole or in part for the business of keeping or storing any such goods or articles. Sprinklers can be ordered in buildings coming within the foregoing classes only when four or more people live or are regularly employed above the second floor. The law was just a year old on the first of this month, but it has been in practice only about six or eight months. In that time it has met with remarkable success. Up to August 1 of this year, approximately 185 buildings have been equipped with automatic sprinklers, and 37 buildings are now in the process of being equipped."

This shows how extensive the installation of automatic sprinklers, by municipal order is becoming. In New York City, the fire commissioner is quite as busy as the fire commissioner of Boston. And if other fire commissioners and State fire marshals have not the authority to order the owners of buildings to put in sprinklers, they will soon have the power. SAFETY ENGINEERING is glad to see the sprinklers going in where they are needed because it is clearly in the public interest that the lives of employes should be protected. There should be no repetition of the Triangle Waist Company disaster in New York, or of the clothing factory fire in Binghamton, or of the High street fire in Newark. The automatic sprinkler affords a remarkable protection against the danger (practically the certainty) of fatalities by fires and panics.

But there is another side to the question, also in the public interest. If a property owner is ordered to install a sprinkler system, he should be able to get it at a cost that is regulated by free and open competition. Perhaps just that condition exists today—but it ought to be made unmistakably plain that it does exist. That is the reason SAFETY ENGINEERING will venture to suggest to the automatic sprinkler companies, associated in a sprinkler manufacturers' association, that it might be a wise policy on their part to forestall possible criticism, and investigation by properly constituted authorities, by showing the people that they are in no sense a trust; that each company is a keen competitor of all the others; and that the prices of sprinkler "specialties" are as low as they

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should be. It will be unfortunate for the sprinkler companies, associated in a sprinkler manufacturers' association, if the public should come to think of them collectively as exercising any sort of control over the installation of sprinklers that is not entirely in the public interest. It will not do to tell the public that sprinkler systems "cost nothing" because the saving in insurance premiums will pay for them in five or seven years, and that equipment companies stand ready to furnish all the capital to equip a man's property, unless it can be shown, on the other hand, that the same saving in premiums would not suffice to pay for the equipment in, perhaps, less time and that equipment companies are not, in some cases, very close to the sprinkler companies themselves. Rapid growth of the "compulsory installation of sprinklers will have an inevitable tendency to bring the sprinkler business into the limelight, in all its departments and ramifications.

Common and Other Causes of Accidents

ONE delusion is passing away, in the campaign to prevent industrial accidents—that every industry has its own peculiar set of accident causes and that practically all the accidents result from those causes. One industry that is certainly quite different from the ordinary run of manufacturing plants is the electric light and power industry. Yet the safety engineer of an electrical company wrote recently to SAFETY ENGINEERING as follows:

"One of the distinctive features of accident statistics in central stations is the relatively low rank that electricity itself holds among the causes of accidents. The returns from the companies generating electricity for commercial purposes, and which have taken an interest in accident prevention work, show that approximately 15 per cent of the accidents to their employes are due purely to electricity. The remaining 85 per cent are due to causes common to all classes of industries, such as falls, falling objects and other similar sources of injury."

If 85 per cent of the accidents in central stations are due to "causes common to all classes of industries," it may be inferred that most of the accidents in every manufacturing plant are due to common causes. Safety work means taking care of all the common causes of accidents—which includes the carelessness of workmen, the elimination of chance-takers and the inculcation of the safety habit.

Fire Prevention Day

OCTOBER 9, the anniversary of the Chicago fire, is the day named by many Governors of States as Fire Prevention Day. The National Fire Protection Association has prepared a program for communities that plan a celebration, providing for a parade of militia, members of the city government, bands (playing Handel's fire music), civic societies, floats, boy scouts, labor unions, etc. On the banners are such inscriptions as "Fire kills 1,500 people annually in the United States," "The workers suffer most from fire," etc. For exercises in the evening, an allegory called "The Dream" is suggested, calling for a cast of four dreamers and an interpreter. One example of the interpretation of a dream is "Get an asbestos suit and practice running with a blanket over your head."

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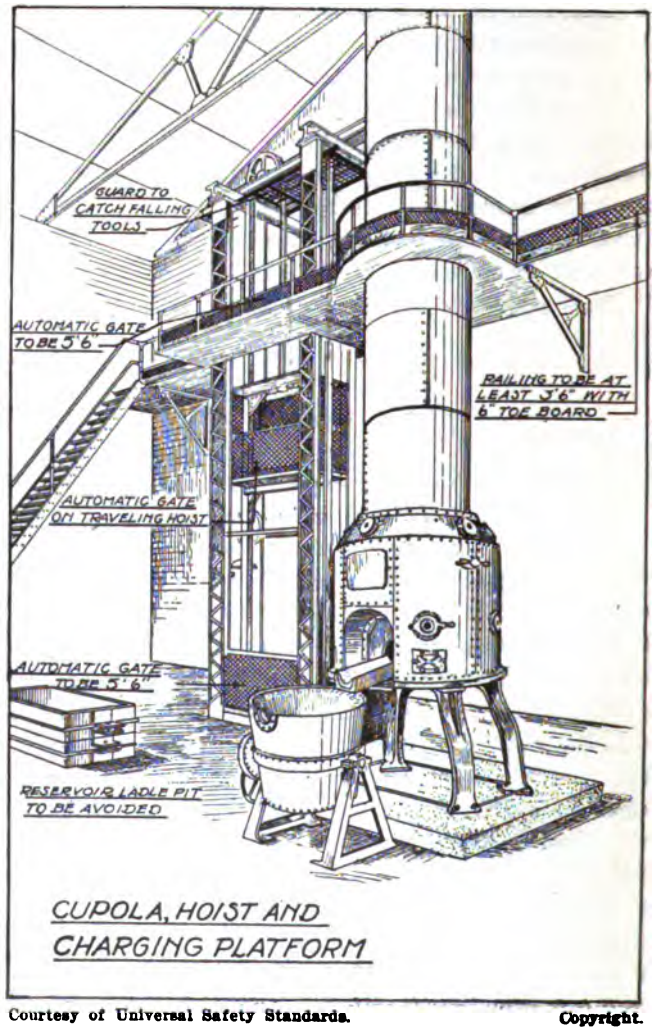
ELEMENTS OF SAFEGUARDING

THE IRON FOUNDRY—PART I.

By F. W. Bail.

THE American iron foundry may well be termed a barometer of the nation's prosperity, but it falls somewhat short of recording the peaks of the nation's industrial safety. This shortcoming is partially due to dangerous working conditions which still prevail in many plants, but is chiefly caused by the fact that safety is more dependent upon the "human element" in foundry work than in most other industries. These causes are the reciprocal conditions of each other. Dangerous working conditions often inject a spirit of recklessness in the morale of the entire force, while a force of indifferent workmen can make the working conditions deplorable in the best foundries. Maximum safety in foundry work, as in most other industries, can only be attained by providing safe working conditions and training the workmen in safe practices.

The provision of safe working conditions necessitates in many cases the design and erection of entirely new buildings; many plants may be found today in which all departments, except the foundry, have left their old abodes for new and efficiently designed, fire resisting buildings, while the foundry remains in the old tumbled down, knot hole lighted, and crack ventilated shed, where it turned out ordnance for the civil war. The iron founder, whose trade, although involving heavy and dirty work, is nevertheless one of the most exacting of all trades, deserving a dry, well lighted and ventilated building. The decrease in lost castings and the increased output have been shown in numerous cases to repay the cost within a few years. The past generation has seen great improvement in regard to efficiency in the design of industrial buildings, but many architects and engineers have entirely overlooked the fact that safety and sanitation are among the most important components


GUARD TO CATCH FALLING TOOLS
AUTOMATIC GATE TO BE 5'6"
RAILING TO BE AT LEAST 3'6" WITH 6" TOE BOARD
AUTOMATIC GATE ON TRAVELING HOIST
AUTOMATIC GATE TO BE 5'6"
RESERVOIR LADLE PIT TO BE AVOIDED
CUPOLA, HOIST AND CHARGING PLATFORM

Courtesy of Universal Safety Standards. Copyright.

Fig. 1.

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of any industrial efficiency system.

Scarcely two foundries can be found whose location and line of work warrant the same design, but there are a few good conditions which should be provided for in the design of any foundry. The dryness of the site chosen is of primary importance, and especially so when the foundry is expected to turn out a heavy line of castings which require floor bedding or pits. Unnoticed leakage or dampness in such bedding or pits has caused fatal explosions of sufficient violence to break out the windows and spray the floor with molten metal.

The building should be of thoroughly fire resisting construction, the choice of materials depending largely on local conditions.

The facilities for bringing the raw material to the charging floor and the means of removing the finished castings and waste products should then be considered. The installation of overhead traveling cranes, jib cranes, hoists, and so forth, should be provided for with a view of relieving the workmen of as much heavy lifting as possible. Adequate foot walks should be placed parallel with the traveling crane runways.

Ventilation may well be the next consideration. Gas, steam and smoke are always generated at casting time, and numerous accidents have occurred while workmen were carrying hand or bull ladles filled with molten metal through clouds of dense fog composed of these elements. A foundry, the lowest roof of which is 25 feet above the floor and the highest point of which is supplied with ample vents, solves its own ventilation problem—gas, steam and smoke will then rise well above the heads of the men. It has been found by experiment that men work more cheerfully under good natural light than under the best artificial light, and since the former is also more economical it behooves the designer to provide all the window space possible, especially in the roof and around the section where bench work is carried on. It is impossible to provide too much window space, but the windows should be so exposed that they will not admit the direct rays of the sun which cause considerable trouble by drying out

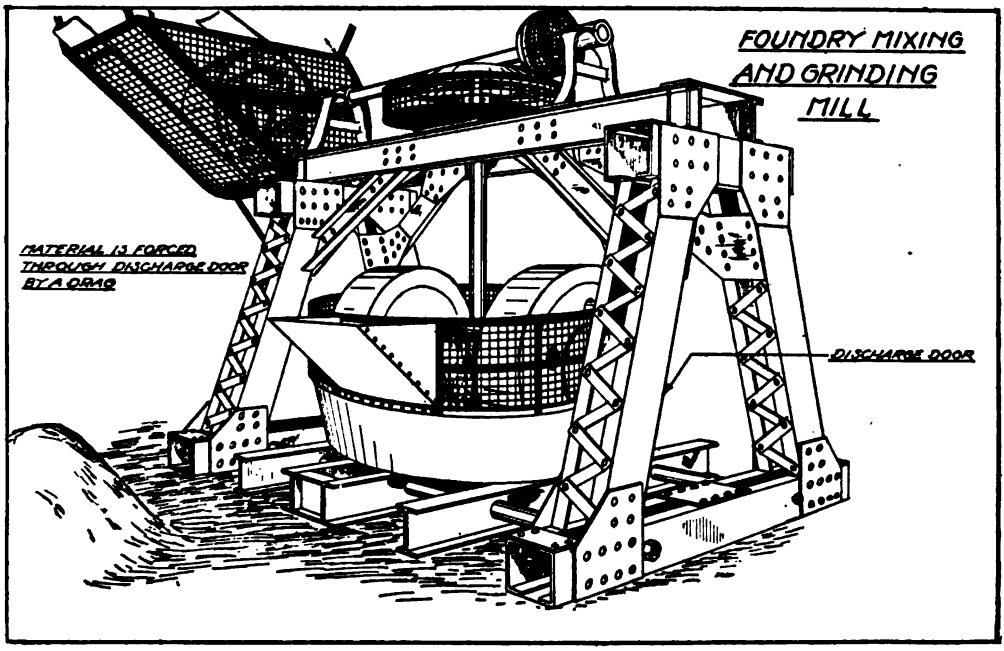

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Fig. 2.

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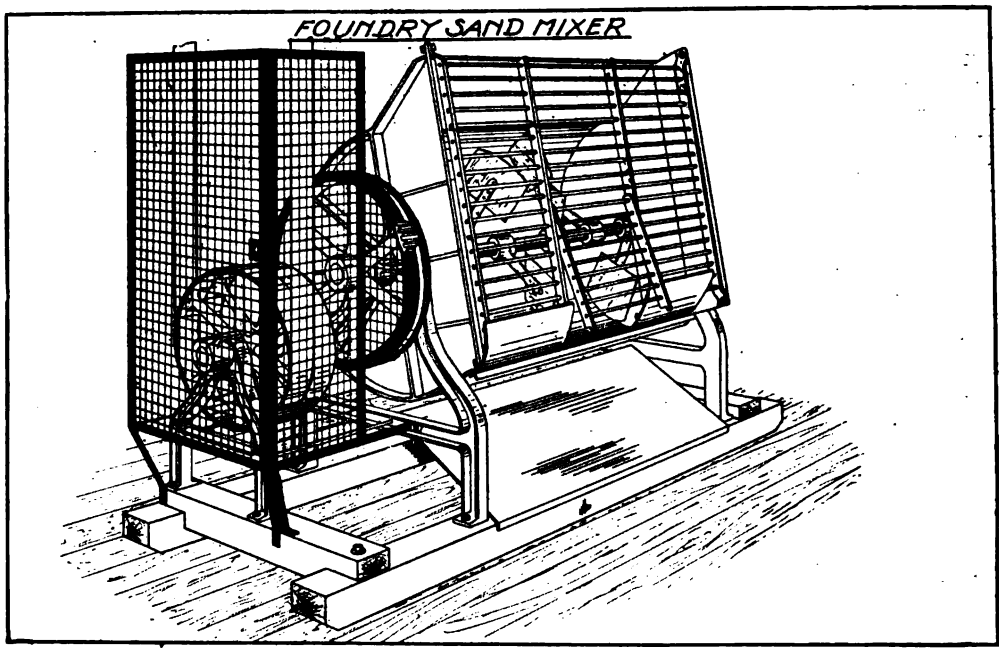

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Fig. 3.

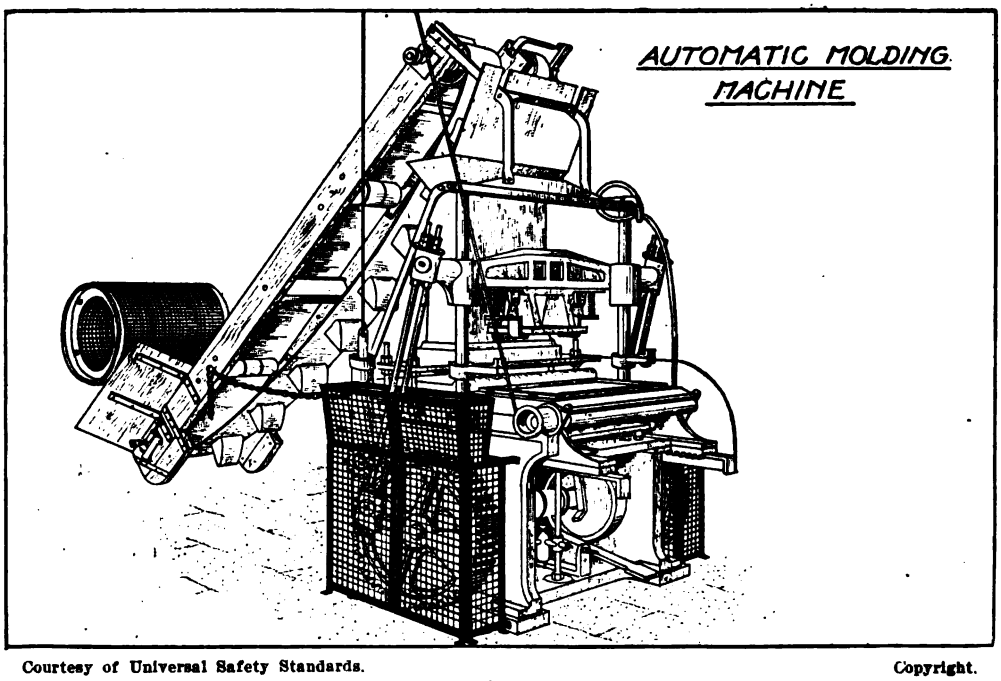

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Fig. 4.

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moulds and sand piles. Since dust accumulates so rapidly on most foundry windows that they need cleaning at least once a week, provision should be made in the design of the building for foot walks or other devices which will enable the window cleaners to work rapidly without placing their lives in jeopardy.

Provision for ample artificial light is also necessary in almost every foundry; during the winter months and cloudy seasons there are certain parts of the day, especially toward the late afternoon, when the casting is usually done, when it is practically impossible to work with any degree of safety without the assistance of artificial light. Many foundries run night shifts, while in others it is the practice to clean up the floor during the night. In any case, a good system of artificial lighting is absolutely necessary. Practically any illuminant may be used, depending upon the location of the foundry, but there are again a few underlying principles in regard to installation which should not be violated. Even distribution is essential, and it is best obtained by placing high candle powered lamps equipped with reflectors at a sufficient height above the workmen to prevent the eyes from being subjected to a direct glare. The lights should not, however, be so near the roof that they will become enveloped in clouds of smoke and steam at casting time. Where lamps are placed above traveling cranes, thus causing the crane to cast a shadow on the floor, a light placed on the crane beneath the girders will overcome this difficulty. An ample number of sockets should be located around the benches and permanent pits. It is well to also provide an auxiliary system of lighting, although plenty of well trimmed and filled lanterns will usually suffice in an emergency when the regular supply of light fails.

Rooms should be provided, adjoining the main shed, for core ovens as well as tumbling barrels and other cleaning equipment. The gases from the ovens should be taken off in hoods and the dry tumbling barrels should be supplied with exhausts. The cleaning room should be kept well away from the moulding floor, as moulders are often annoyed by the deafening din from the tumbling barrels.

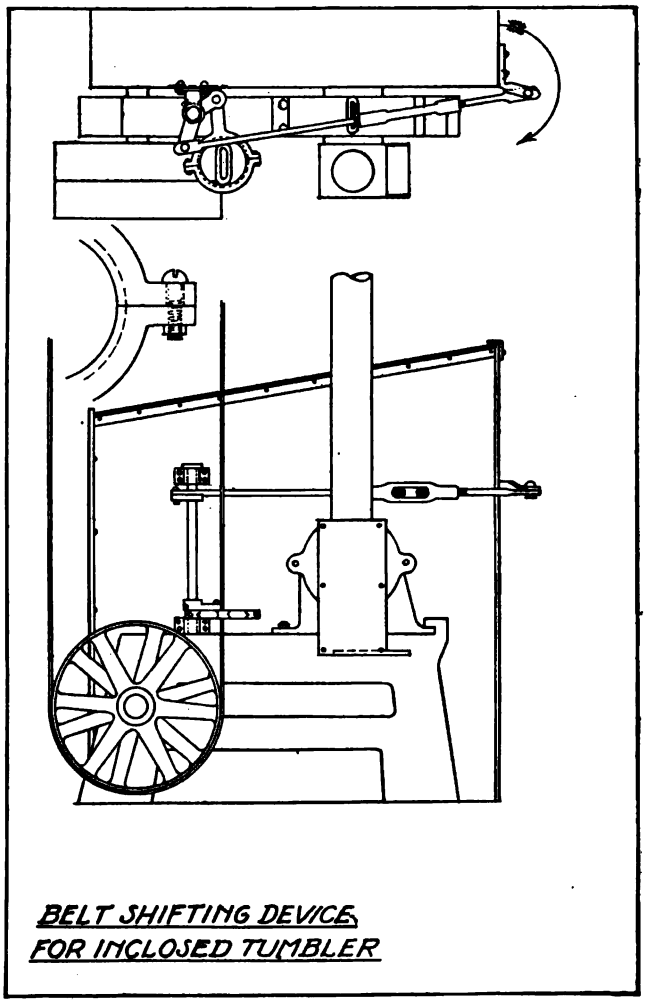

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Fig. 5.

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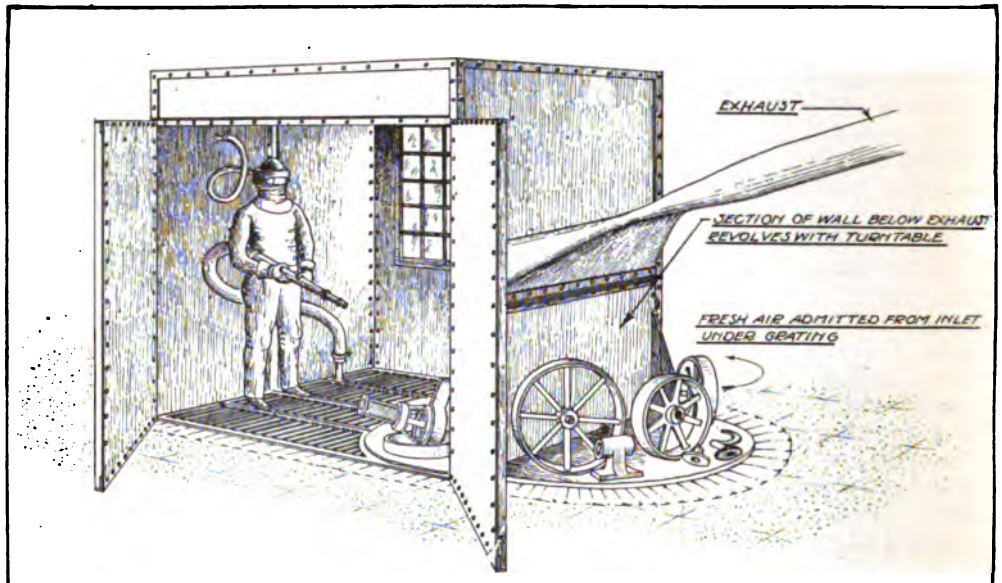
Ample wash room and toilet facilities should be provided, and where possible a room for drying and changing clothes should adjoin the wash room.

Plenty of doors should be provided around cupola. Hung doors with guarded counter weights and automatic safety stops have proven quite efficient.

The foundry yard should be levelled off and good cinder paths and artificial lighting provided.

Many pieces of foundry equipment present mechanical and other hazards which should be carefully studied and guarded. be equipped with standard hand rails. See Fig. 1.

No piece of mechanism is subject to such severe change of temperature as the crane ladle, and it, therefore, requires careful design, guarding and inspection. Only the machine cut and ground gears should be used and these should be guarded with a solid cover to prevent the metal from splashing into the teeth and causing them to break. Where a worm gear is used, two or more teeth should engage the worm wheel. The ladle should be so balanced that it will remain


EXHAUST
SECTION OF WALL BELOW EXHAUST REVOLVES WITH TURNTABLE
FRESH AIR ADMITTED FROM INLET UNDER GRATING
SAND BLAST CHAMBER

Courtesy of Universal Safety Standards. Copyright.

Fig. 6.

The cupola lining should be well anchored with horizontal angle irons, making it safe to remove one section for repairs without disturbing the others. Counter weighted charging doors should have the counter weights protected, and doors mounted on wheels should be provided with wheel guards. The cupola should be equipped with an efficient spark arrester, or a stack of sufficient height will serve the same purpose. The slag spout should be equipped with a spark shield. All hoists should be provided with automatic locks and the charging platforms should normally upright regardless of the amount of metal in it. The bottom should not be so heavy, however, that it will prevent smooth pouring. All crane ladles should be equipped with automatic shank or trunnion locks, which will retain them in an upright position while traveling. The grinding mill (Fig. 2) should have the wheels so guarded that the workman's clothes cannot catch on them and drag him in, care to be taken that ample clearance is provided between the guard and the wheels. The driving gears should be guarded and the crown

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gear so protected that in case segments break out they will not fall on the workmen. Where the revolving pan is used it may be guarded by a broad sheet metal band guard. The driving mechanism should be protected according to Universal Safety Standards.

Sand mixers of type shown in Fig. 3 are exceedingly dangerous; they are fed as a rule from a platform on a level with the top, making it easy for the workmen to accidentally fall in. This danger is sometimes overcome by placing a hand rail on the platform, but the better method is that of covering the entire opening with a grating of round stock about ⅜ inch, space 2 inches O. C. and sufficiently re-enforced to ensure rigidity. This guard also prevents shovels from falling in. The driving mechanism is guarded in the usual manner. Sand sifters, unless high powered, seldom need guarding.

Certain types of automatic moulding machines present mechanical hazards which require protection. A suggestion for guarding common types is shown in Fig. 4.

The tumbling barrel in its various forms requires individual study and treatment, but in general they should be enclosed in a dust proof chamber equipped with adequate exhaust (except in the case of wet mills), and the chamber should be connected automatically with the belt shifter and in certain cases with the brake. (See Automatic Belt Shifting Device, Fig. 5.) Hand hoists should be provided for removing covers when they are of considerable size. The barrel should also be equipped with a suitable automatic locking device which will prevent it from turning while being unloaded.

The sand blast should be completely isolated from the rest of the cleaning room. Fig. 6 is a suggestion for a sand blast chamber equipped with a turn table for small castings.

INDUSTRIAL ACCIDENTS IN MAINE

The second biennial report of Commissioner Eddy of the Department of Labor and Industry of Maine has particulars of industrial accidents in 1913 and 1914, year ending June 30. The reports of industrial accidents are required from employers by Chapter 102 of the laws of 1911. The term "serious physical injuries," as used in the act is construed to mean every accident which results in the death of an employe or causes his absence from work for at least six days thereafter.

The tabulation of accidents in which disability exceeded six days has these figures:

	1913	1914
Total accidents	1,128	974
Fatal cases	55	26
CAUSES OF ACCIDENTS.		
Motors—engines	3	1
Shafting, gears, belts, pulleys, ropes, cables, chains, sprockets, and set screws	98	72
Cranes and derricks	4	2
Machines, miscellaneous	93	105
Conveyors	6	2
Planers	17	16
Saws	56	50
Woodworking machines other than planers and saws	22	18
Presses	7	4
Paper making machinery	90	74
Elevators	15	17
Explosions (other than boiler)	3	3
Boiler explosions	2	—
Electricity	5	2
Inflammable, hot or corrosive substances	46	47
Collapse or hit by objects	276	234
Fall from stairs	7	7
Fall from ladders	14	4
Fall from scaffolds	6	9
Fall from buildings	1	2
Fall down elevator shafts	2	1
Falls into excavations	4	5
Falls, other than specified	88	77
Loading or handling heavy objects	77	38
Teaming, draying, etc.	8	16
Tools, hand apparatus	40	44
Miscellaneous	124	111
Not specified	14	13
CLASSIFIED BY INDUSTRIES.		
Chemicals and allied products	—	5
Food and kindred products	5	9
Quarrying, granite cutting, etc.	28	26
Shoe manufacture	4	14
Tanneries	5	7
Lumber and its remanufacture	176	131
Foundries, iron, steel and other metal products	57	39
Gas, water, electric and telephone companies	24	16
Paper box and bag makers	15	10
Textile industry	126	177
Trade	4	—
Pulp and paper manufacture	596	430
Railroad repair shops	43	53
Building and hand trades	3	3
Miscellaneous	43	54

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SAFETY "MOVIES" IN PEORIA

When Mr. H. L. Brownell, Safety Inspector of the Chicago Surface Lines Company, lectured on safety in Peoria, Ill., on September 3. the theater people asked the local council of the National Safety Council to provide a display of safety bulletins in front of the theater. The audience filled the auditorium to capacity and every person stopped and read the bulletins before entering the theater. Mr. Brownell's lecture, illustrated with 3,000 feet of safety films and more than 100 slides, has been delivered about 700 times and has been heard by about 400,000 persons. The surface lines of Chicago report a remarkable reduction in the number of accidents as the result of his work.

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GRINDING WHEEL SAFEGUARDING

By J. S. Kopf, Inspector Aetna Life Insurance Co.

A GREAT deal has recently been written regarding safeguards and safeguarding of employes. The writer is fortunate in having been one of the pioneers in the safety field, and as such has had his share of "ups" and "downs" (chiefly "downs"), meeting with all kinds of people and using all manner of arguments and illustration to bring home the lesson of safety, viz., that conservation of human life and limb, besides being a humanitarian duty of man to fellow man, is also a highly profitable investment. Times without number, when an appeal to an employer's sense of duty has failed, the jingle of money in his pocket has brought him to see things in the right light. The reason an employer is apparently obdurate or not amenable to suggestions advanced by an inspector is not always because he is stubborn or backward, but because of a limited capital he finds it nearly impossible to make any additional alterations without an apparent return on the investment. Put your argument in such a way as to appeal to his cash book, and, instead of being obliged to talk blisters on your tongue or write countless letters, he will "come across" quick.

Fig. 1.

It was in this way that the writer induced one of the largest automobile manufacturers in this country to consider this matter, not as a fad or overzealousness on the part of an inspector; and by trying it out in a limited way at first, found it to be a big dividend payer besides making the firm a "good fellow" among the workmen. This plant today employs in the neighborhood of 5,000 men, and each and every one is "working for the house" every hour of the working day. Not only has this company gone so far as to install individual enameled wash stands, towels, soap, toilets, excellent dining room with music at meals, first aid dispensary with physician and male nurse, rest rooms and countless other conveniences, but it has also its Safety Committees with safety inspector making periodical inspections, consequent recommendations being made to the minutest detail in safeguarding. No suggestion is too big or too small to receive consideration. A bulletin board is hung where it is observed by all, and new material is posted every few days. Each accident of importance is photographed and suggestions made to prevent a recurrence. A blueprint bearing the photos and explanation occupies the central position on this board.

At this plant, as well as at numerous others, the suggestion of *substantial* retaining hoods on emery wheels was at first taken with a grain of salt, to say nothing of the consequent suggestion of safety flanges, both of which the writer considers essential features on any emery wheel for rough grinding. After a short experience in safety investment it was not a difficult task to get this firm entirely and enthusiastically aboard the Safety band-wagon, however, so that today on all grinding wheels there are used hoods which are designed not to break from

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any wheel disruption. They are made of ⅜-inch malleable casting and have one inch clearance over the wheel around the entire periphery. Flanges, too, are designed so as to offer maximum retaining strength with minimum strain on wheel.

Figures 1 and 2 show the disruption

Fig 2.

of two 2½-inch x 20-inch wheels. These pictures do not show the same break, but a very significant fact is the striking similarity. No. 1 had been running two weeks and No. 2 had been mounted only three minutes; yet these breaks are almost identical in character and detail. These wheels were designed to run at 6,000 rim feet per minute, and at time of disruption were running at 5,800 rim feet per minute. The most effective attachment from a safety standpoint on any grinding stand such as this is a substantial retaining hood with safety flanges a close second. This fact is amply illustrated in the photos. The room where the wheels were mounted is arranged similarly to most of its kind. Workmen were numerous and in close proximity to the wheels. No. 1 caused a slight injury to the operator's abdomen, while No. 4 caused no injury whatever. What might have happened to the retaining hood without the safety flange and what might have happened to the operator and others in the room without the retaining hood, or without either hood or flange of substantial design, is a matter requiring little exercise of the imagination. Neither the hood nor the flange was damaged to the slightest extent in either of these disruptions, as is indicated in Fig. 3.

In conclusion it may be well to point to the logical deduction from these facts, viz.: Design your safeguards to best suit

Fig. 3.

your work and then construct them of materials to withstand any possible demand upon them and still be safeguards after the test.

ORPHANS BURNED TO DEATH

At least five lives were lost by the burning of St. Francis' Girls Directory, a Roman Catholic institution in San Francisco, on September 4. Fires in institutional buildings are numerous. SAFETY ENGINEERING's fire records show 35 or more during 1915.

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BORING MILL GUARDS.

The picture here shown indicates clearly the construction of a boring mill table guard and a practical counterweight guard. When small stock is being turned the table, if large, usually has a high rim speed, making it the chief hazard of the boring mill. Many serious accidents have occured when workmen's clothes have caught in the table and the workman has been dashed against the frame of the machine. A band guard such as the one shown in the photograph, overcomes this danger and at the same time interferes in no way with the operation, if provision is made in the form of slides in the band for the insertion of bolts in the table groove or the adjustment of jaws on a Universal table. The construction of the band guard is clearly shown in the photograph.

The counterweight has been completely encased by a cylinder of screen and scrap iron. Where circumstances permit, the space taken by counterweight guard can be saved by suspending it entirely below the floor.

The bevelled gears at the top of the feed rods should be guarded, although they are in a remote position, for many hands have been mangled in just such "out of reach" places.

Showing Guards Around Counterweight and Table. Note Slides on Table Guards.

"JAY WALKING."

Crossing the streets diagonally at intersection is called "Jay Walking" in Columbus, Ohio. Anyone guilty of "Jay Walking" may promptly be arrested and fined from $5 to $25. The same law says that if a pedestrian fails to walk to the right when passing anyone coming from the opposite direction on any sidewalk, he is also liable to the same penalty.

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SAFETY ON THE PITTSBURGH & LAKE ERIE

By A. D. Brown, Chairman Central Safety Committee, Pittsburgh & Lake Erie Railroad Company.

I have been a reader of SAFETY ENGINEERING ever since it was first published, and it has occurred to me that your readers might be interested in knowing something about what has been done for accident prevention on the Pittsburgh & Lake Erie Railroad.

The Pittsburgh & Lake Erie, since its inception, has made "safety" the first consideration. No effort has been spared by its management to make the road a safe one for passengers and for employes also. During the thirty-seven years it has been in operation, not a single passenger has been killed and only a comparatively few injured.

In its shops no expense has been spared to safeguard machines which, if left unguarded, might be the cause of injury to employes. All workmen employed in cutting, grinding, riveting, or similar occupations where there is liability to injury to their eyes, are provided by the company with suitable glass goggles of the best quality and design.

The company has built and equipped splendid Y. M. C. A. clubhouses at its three principal terminals, which provide accommodations for men away from home, giving opportunity for rest and refreshment amid pleasant, comfortable surroundings. These privileges are open to all employes on payment of a nominal yearly fee. These rest houses are large factors in making *safe* men.

Notwithstanding what had already been done to make this road safe in every respect, the management inaugurated, several years ago, a definite specialized effort toward accident prevention through a form of committee organization composed of a central committee and sub-committees, comprising officers and employes in all departments of the service. These committees hold meetings and make inspections regularly, submit recommendations which are acted upon promptly, and have in general accomplished a great deal to improve conditions from a safety standpoint.

As a part of the program to keep the subject of safety continually present in the minds of employes, one of the sub-committees arranged a "Safety First" exhibit at a recent outing of the road's employes. The exhibit consisted of various photographs showing safe and unsafe practices, charts containing statistics of personal injuries, bulletins bearing on the subject, etc. There was also a supply of interesting literature which was given to all visitors. The idea of holding such an exhibit at an affair of this kind may be something new.

Together with its work along accident prevention lines, the company has developed to a high degree of efficiency a little company of men who have equipped themselves to render first aid to men who may be injured. In order to do this the company has retained, under salary, a man thoroughly drilled in army and American Red Cross first aid methods, who educates the men in this work. The men who take the course seem to enjoy it and soon become proficient. Through this voluntary first aid work an injured employe is made more comfortable until the arrival of a surgeon, and frequently action is taken by the first aid man which prevents infection, or other serious complications, which might otherwise ensue if no attention, or ignorant attention, were given the man.

At the outing of employes, to which I have referred above, a contest was held between first aid teams from three terminals. The contest consisted in taking three men, who were supposed to have met with injury, such as scald, broken limb, etc., and having each of the first aid teams apply the appropriate first aid attention. A record was kept of the time occupied by each team, and two of the company's surgeons, one of them the general surgeon of the road, inspected the work done and awarded the cup to the team doing the best work, taking into consideration not only the technique but the time required as well. The prize was a handsome loving cup, donated by the outing committee. A great deal of interest was developed among the employes of the company by means of this contest.

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HANDLING DUST AND FUMES

The elimination of wood-dust and fumes from finishing fluids, volatile oils, etc., has troubled many manufacturers. The Industrial Commissioner of Wisconsin, in a circular letter to the deputies employed by the commission, cites the success achieved in that direction by a furniture company in Sheboygan, Wis.:

"Most of the deputies to this commission have been having some difficulty in getting fans, suction devices, and the like, installed in factories where dust and fumes are extant. The commission was pleased today to receive the following letter from Mr. John Humphrey:

"'The other day I inspected the plant of the Northern Furniture Company of Sheboygan. I found the best safety and sanitary condition there that there is in any factory in my district. The suction system is first-class, and in addition to that, they have fans to take up any fine dust which might float in the workrooms, and be inhaled by the employes.

"'In the varnish rooms, the suction and the ventilating system is such that a person cannot smell varnish fumes.

"'The toilet rooms are well ventilated and clean, and sanitary bubblers are provided in each room. The gangways are kept clear in all of the departments, and everything seems to be in its place.

"'Outside of two elevators located in a warehouse away from the factory, I failed to find anything that I could not recommend. A great deal of credit should be given to Mr. Burdick, superintendent, for having this place brought to such a high standard. He told me that one of the best investments a manufacturer can make is to have his factory safe, clean and sanitary, and this is certainly a model in that respect.'"

Commissioner Beck tells the deputies of the Industrial Commission of Wisconsin that whenever they have problems of that kind which they seem to be unable to solve, it might be well for them to visit the factory of the Northern Furniture Company, in order to get pointers on how to handle the dust and fume problem for other employers."

PROTECTION WHILE CHIPPING AT VISE

Here is shown a most effective method of safeguarding the employes in this Southern Pacific Railroad shop, from flying rivet heads which the workman is

Portable Curtain to Protect Men While Chipping at Vise.

chipping from discarded shovels. In passing, however, we cannot help but comment on the ingenuity of the foreman who made use of the device itself, an advertisement of "Safety First" as well.

SAME ACCIDENT CAUSES EVERYWHERE

An analysis of the accidents occurring during 1914 to workmen in the service of the Pacific Gas & Electric Company, San Francisco, shows that out of 695 accidents during the year, over 71 per cent were due to common causes, while less than 29 per cent were due to causes inherent to the particular occupation.

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"SAFETY" MOTION PICTURES

Through the courtesy of its members the National Safety Council announces that the following "safety" films are securable through the council:

INDUSTRIAL SAFETY:

An American in the Making. The Workman's Lesson. Illinois Steel Company, Chicago.

The Man He Might Have Been. (Industrial Education.) National Association of Manufacturers, New York.

Safe and Unsafe Practices. J. G. Brill Company, Philadelphia.

Film Illustrating Hazards of the Lead Industry. Harrison Brothers & Co., Philadelphia.

Films of Safety Devices Used on Machines in Camera Shops. Eastman Kodak Company, Rochester, N. Y.

PUBLIC SAFETY:

Film of Street and Street Car Accidents. Chicago Railways Co., Chicago.

Pictures Illustrating Causes of Accidents on Street and in and Around Street Cars. Pittsburgh Street Railway Company, Pittsburgh.

Safe and Unsafe Practices on Interurban Electric Railways. Pacific Electric Railways Company, Los Angeles, Cal.

RAILROAD SAFETY:

Steve Hill's Awakening. New York Central Lines, New York.

Pictures Illustrating Hazards of Trainmen Working in and About Cars. The Right and Wrong Practices in Railroads. Chicago, Rock Island & Pacific Railway, Chicago.

ELECTRICAL SAFETY:

The Lineman. (A rental fee of $10 is charged for this film.) National Electric Light Association, New York.

FIRE PREVENTION:

The Crime of Carelessness. A vivid representation of the need for vigilance in fire prevention. National Association of Manufacturers, New York.

ENTERTAINMENT FILMS:

The Assembling of an Automobile. Ford Motor Car Company, Detroit.

The Making of an Automobile Piston. Ford Motor Car Company, Detroit.

Use of Explosives on Farms. E. I. Du-Pont-de Nemours Powder Company. Wilmington, Del.

Safety Engineering. Underwriters' Laboratories, Inc., Chicago.

Wood Pulp and Paper Industry. Industrial Moving Picture Company, Chicago.

A motion picture film showing the different operations in the construction of large office buildings has been prepared.

Clifford Harrod, of Indianapolis, has arranged a motion picture exhibit car for the Pennsylvania railroad, planned to meet all ideas for "Safety First." Films have been made to show the operation, in detail, of various signal mechanisms, the handling of tools and such electrical work as the right and wrong ways of removing insulation from wire.

To examine engineers on signals by showing them a motion picture taken from the front of a train, over the road with which they are familiar, seems the most logical method available. The time element involved in the quickness of decision can be obtained, as well as the accuracy of vision, together with what aspect the engineer would expect to receive on arriving at the next signal.

SAFETY IN SHIPBUILDING

The safety committee of the Fore River Ship Building Corporation, Quincy, Mass., gives these particulars of 171 accidents during the six months period ending April 30, 1915:

	Per Cent.
On ships	42.6
In shops	43.8
In yard	13.6
Might have been prevented by safeguards	18.1
Carelessness of men	67.3
Carelessness of fellow employe	14.6
Skilled	55.5
Unskilled	44.5

The hours lost in the works due to accidents, shows a reduction of fifty-six per cent for April, May and June over the record for the first three months after the campaign was started.

A personal education is necessary for a proper application of safe and efficient methods in any plant.—*T. Carter Tiller.*

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SAFETY DEVICES IN HUDSON TUNNELS

All cars operated through the Hudson tunnels are of all steel and every car is equipped with an automatic train-stopping device. The car control is the multiple unit system, including the "dead man's button" on the controller. Every car is equipped with air brakes, with double control, pneumatic and electric, and also with hand brakes for emergency purpose. All car doors, except intercommunicating doors, are electrically controlled and pneumatically operated. The electrical energy for such operation is supplied from storage batteries. The edges of all doors thus operated are equipped with three-inch soft rubber collapsible cushions, minimizing the possibilities of injury which might be caused by being caught in or struck by a closing door. Special valves regulate the speed at which the doors may be closed. The cars have sanitary composition flooring, and are cleaned three times daily.

In the car shops belt-driven machinery, gears and revolving parts have been equipped with guards to prevent accidents. Shop cranes and hoisting apparatus are attended by special operators, and they only are allowed to operate the machinery, thus avoiding accidents due to lack of familiarity with the appliances. As far as possible, pneumatic tools are used instead of hand tools. Inspection pits are equipped with automatic "warning" whistles.

In the main power house consideration is given to the matter of a continuous inspection and study of working conditions, and the plant is kept at its highest point of efficiency and safety. All galleries, stairways and platforms are protected by railings, and open elevator shafts are protected by screens. The high voltage switches and wiring are enclosed behind fireproof partitions and doors, and confined in one chamber. All moving belts and gears are protected by guards and railings, and permanent platforms and galleries, instead of temporary scaffolding, are constructed wherever necessary.

Precautions have been taken in the stations to guard against electrical shocks, and a testing device is provided to determine positively that currents are turned off before repairs or cleaning are begun. Guard railings have been installed, and all low tension switches are operated from rubber matting. Each sub-station is provided with a pulmotor, and at all times not less than two men are continually on duty.

In the cars have been posted placards under the caption "Safety First.". The cards contain suggestions to the public as to protective measures which they should observe. Similar signs are displayed in the stations, and warning signs are displayed at appropriate points, cautioning passengers against leaning over the edges of platforms and such actions as might endanger them.

Before employment every applicant must submit to a rigid physical examination by the medical officer. At intervals employes in train service are re-examined, and those found to be defective, particularly in heart action and eyesight, are removed from such service. As far as possible such men are provided with other employment in which their physical defects will not debar them from satisfactory service.

ENGINEERS DISCUSS SAFETY

Papers on safety subjects that are to be read at the International Engineering Congress, at San Francisco, September 20-25:

"Workman's Compensation and Mine Safety." H. M. Wilson, member American Society Civil Engineers, director of Coal Mine Insurance Association, Hartford, Conn.

"Mine Inspection." J. W. Paul, American State Mine Inspectors' Association, Pittsburgh, Pa.

"Safety Engineering." Frederic Remsen Hutton, Sc.D., past president American Society of Mechanical Engineers and honorary secretary, vice-president American Museum of Safety, New York.

"Fire Protection." John R. Freeman, consulting engineer, past president American Society Mechanical Engineers, member American Society Civil Engineers, Providence, R. I.

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NATIONAL SAFETY COUNCIL

IN THIS DEPARTMENT ARE ARTICLES AND NEWS REPORTS CONCERNING THE NATIONAL SAFETY COUNCIL AND ITS LOCAL COUNCILS, FURNISHED EXCLUSIVELY TO "SAFETY ENGINEERING"

FOURTH ANNUAL MEETING AND CONGRESS OF THE NATIONAL SAFETY COUNCIL

THE National Safety Council is the representative and Nation-wide organization in the United States for the prevention of accidents in the industries, on the railroads, and in public places. Its 5,000 representatives are located in every State of the Union, except two. Over 150 varied industries are represented in this group, as well as many associations, State departments, insurance companies and other agencies interested in the prevention of industrial and public accidents, medical supervision of workmen, and other social betterments.

Accident prevention symbolizes the interest of the American people in the conservation of human life. Never before has a National humanitarian movement aroused to a greater extent the minds and energies of business people for the betterment of social conditions. The American people realize that through the prevention of accidents they are touching in a constructive way every phase of progressive and improved social conditions.

What is the principal outstanding reason for people to assemble from all parts of the country to attend an accident-prevention annual meeting and congress? Because the spread of the safety idea is based upon methods of education, and it is through education that reductions in accidents will be secured. There are other reasons for attending such meetings, such as the need for exchanging ideas and information about particular problems in safeguarding, organization methods, medical supervision and care of employes, etc.

These annual congresses influence tremendously the progress which may be made in accident prevention work. By their instrumentality the movement must be pushed forward with increasing fervor and intensity. There must be no slackening of effort. The many problems must be solved. These meetings are the starting point for another year's persistent effort; encouragement is received from the knowledge that many co-workers are engaged upon the same problem, and the spirit of common helpfulness is developed in such a way that each one realizes that this is a National movement and that the co-operation of every individual having a connection with it is required to accomplish ideal results.

A glance at the program, on the next page, will indicate that the form of the sessions this year is different from any other previous safety meeting. Some important addresses will be made by noted speakers on the general principles underlying the prevention of accidents, but four-fifths of the congress will consist of meetings of various groups of persons interested in the safety problems of particular industries. The National Council is thus following the experience of other large National associations by dividing its activities into various sectional conferences. There are, for instance, problems connected with the woodworking industry that are not par-

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ticularly interesting to men trying to solve the accident problem of the cement industry, so that separate meetings will be provided for each group. It will be noted also that twelve of these sectional meetings have been arranged for, and not one attendant at this annual congress need have an idle moment, if he is willing to take advantage of all the opportunities provided for him.

The prestige of the United States must be freed from the stigma of the many unnecessary accidents that are occurring in the industries, in the public places and in the home. Each must do his part in this work. The executive committee and officers of the National Safety Council cordially invite every friend of the safety movement to attend this annual meeting and congress. Come resolved that you will contribute the results of your own experience and with a ready mind to absorb the information which will be given freely by others.

Monday, October 18, 1915

SPECIAL COMMITTEE MEETINGS, 10 a. m. to 4 p. m., for conferences and making final preparations for opening of congress:

Accident Statistics Committee.
Arrangements Committee.
Danger Signs Committee.
Educational Sectional Committee.
Executive Committee.
Industrial Hygiene Committee.
Officers and Committees of Local Councils.
Program Committee.
Railroad Sectional Committee.
Resolutions Committee.
Standardization Committee.
Luncheon for all committees at 1.00 p. m.

Tuesday, October 19, 1915

Registration of Members, Representatives of Members and Visitors, 9 a. m. to 10 a. m.

ANNUAL MEETING OF MEMBERS, 10 a. m. to 12 noon. R. W. Campbell, President, Presiding Officer.

Order of Business:
Prayer.
Adress of Welcome—Dr. Francis D. Patterson, President Philadelphia Local Council.
Response by the President.
Roll Call, or other ascertainment of members present.
President's address.
Reading and disposal of any unapproved Minutes.
Reports of Officers and Committees.
Secretary and Treasurer.
Executive Committee.
Finance Committee.
Program Committee.
Resolutions Committee.
Standardization of Safety Devices Committee.
Industrial Hygiene Committee.
Accident Statistics Committee.
Danger Signs Committee.
Fire Prevention Committee.
Nominating Committee.
Election of Directors.
Unfinished Business.
New Business.

Tuesday, October 19, 1915

GENERAL SESSION, 2 p. m. to 5 p. m. Address will be limited to 20 minutes. Green colored signal will flash at 18 minutes and red signal at 20 minutes.

Chairman, Hon. John Price Jackson, Commissioner, Department of Labor and Industry, Harrisburg, Pa.

Remarks by Chairman.

"The Development of the Safety Idea." Chancellor S. B. McCormick, University of Pittsburgh.

"Public Safety and the Railroads." W. C. Wilson, Claims Attorney, Delaware, Lackawanna & Western.

"Safety as an Indispensable Part of an Efficient Manufacturing Organization."

"The Safety Idea as Related to the 'Credit' of a Business Organization." Charles E. Meek, President, National Credit Men's Association, and National Fire Protection Association.

"The Vital Importance of the Visiting Nurse in Industrial Welfare Work." Miss Florence Hughes, Superintendent Palmerton Neighborhood House, New Jersey Zinc Company, Palmerton, Pa.

"Standardization of Safeguards." Carl M. Hansen, Secretary, Workmen's Compensation Service Bureau.

Moving pictures, 5 p. m. to 6 p. m.

Regular Meeting of Directors for Election of Executive Committee, 5 p. m. to 6 p. m.

Wednesday, October 20, 1915

SECTIONAL ROUND TABLE MEETINGS, 9 a. m. to 12 Noon.

Cement Sectional Meeting.
Laundry Sectional Meeting.
Mining Sectional Meeting.
Paper Manufacturers Sectional Meeting.
Public Utilities Sectional Meeting.
Railroad Sectional Meeting.
Textile Sectional Meeting.

2 p. m. to 5 p. m.:

Medical Supervision and Care of Employes Sectional Meeting.
Railroad Sectional Meeting (Continued).
Safeguarding of Machinery Sectional Meeting.

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Wednesday, October 20, 1915

CEMENT SECTIONAL MEETING, 9 a. m. to 12 Noon.

Chairman, Robert S. Sinclair, Chairman of the Committee on Accident Prevention & Insurance, Association of American Portland Cement Manufacturers.

Ten Minute Discussions:

Accessibility—dealing with the importance of Standard Walks, platforms, stairs, ladders, etc.

Safeguarding Belts and Shafts. Richard H. Gumagan, Engineering Department, The Fidelity & Casualty Company.

Safeguarding Bins, Hoppers and Tanks. Robert Brinton Hill, Department Accident Prevention and Insurance, Association of American Portland Cement Manufacturers.

Safeguarding Coal Mills. W. J. Young, Chief Engineer, Alpha Portland Cement Company, Pennsylvania.

Safeguarding Conveyors and Elevators. Henry A. Reninger, Special Representative, Lehigh Portland Cement Company.

Safeguarding Quarries. A. J. Crowl, Superintendent, Atlas Portland Cement Company.

Wednesday, October 20, 1915

LAUNDRY SECTIONAL MEETING, 9 a. m. to 12 Noon.

Chairman, E. G. Trimble, Manager, Employers Indemnity Exchange.

Introduction and Statement of the Scope of the Industry.

Ten Minute Discussions:

An Ideal Laundry Plant—Emphasizing Welfare Work. Miss Jane Seymour Klink, Manager, Welfare Dept., Pilgrim Laundry, Brooklyn.

Safeguards Now Being Applied to Modern Laundry Machinery.

Danger Features in Laundries, including Extractors and G Flat Work Ironers. M. F. Wilkinson, President, Wilkinson Laundry Company, Reading.

Automatic Covers on Hydro-Extractors. C. W. Price, Assistant to the Commission, Industrial Commission of Wisconsin.

Pneumatically Operated Laundry Machinery. J. Dewey, Master Mechanic, American Laundry Machinery Company.

Some Danger Places in the Average Laundry and How They May Be Safeguarded. John Woodhead, Safety Engineer, Employers Indemnity Exchange, Kansas City. Lantern slides.

Wednesday, October 20, 1915

MINING ROUND TABLE SECTIONAL MEETING, 9 a. m. to 12 Noon.

Chairman, H. M. Wilson, The Associated Companies, Pittsburgh, Pa.

Mine Accident Prevention and Workmen's Compensation.

Ten Minute Discussions:

Sanitation as a Safety Factor in Mining. J. H. White, Sanitary Engineer, Bureau of Mines.

Fatalities and Diseases in Coal Mining Districts. Dr. W. A. Lynott, United States Bureau of Mines.

Accident Prevention in Metal Mines. B. F. Tillson, New Jersey Zinc Company.

Accident Prevention in Coal Mines. R. Dawson Hall, Editor "Coal Age."

Safety of Electrical Installations in Mines. H. H. Clark, U. S. Bureau of Mines.

Fire Prevention in Mines. John Lloyd, Efficiency Engineer, Lehigh Valley Coal Company.

Wednesday, October 20, 1915

PAPER MANUFACTURERS' SECTIONAL ROUND TABLE MEETING, 9 a. m. to 12 Noon.

Chairman, Reuben B. Robertson, General Manager, Champion Fibre Company, Canton, N. C.

Ten Minute Discussions:

Safeguarding Machinery for Making Paper. Edward T. Walsh, Plainfield, N. J.

Hazards of Wood Yard. S. F. Shattuck. Treasurer, Kimberly-Clark Company.

Hazards of Wood Room. J. King, President, Rex Paper Company, Kalamazoo.

Methods of Preventing Burns by Steam and Chemicals, and First Aid Treatment. D. A. Smith, Vice President and General Manager, District of Columbia Paper Mfg. Company, Washington.

Safety Instructions and Warnings for Specific Dangers in Paper Plants. Thomas Fynes, Assistant Treasurer, Continental Paper Bag Company.

Safety Inspection Methods for Large and Small Paper Mills. Dr. A. D. Risteen, Engineering and Inspection Division, Travelers Insurance Company.

Relation of Employment Department to General Safety Problem of Paper Mills.

Wednesday, October 20, 1915

PUBLIC UTILITIES ROUND TABLE SECTIONAL MEETING, 9 a. m. to 12 Noon.

Chairman, Dr. E. B. Rosa, Acting Director, Bureau of Standards, Department of Commerce.

Ten Minute Discussions:

Linemen and Their Operations. C. B. Scott, Manager, Bureau of Safety, Middle West Utilities Company, Chicago.

Danger of Low Tension Shocks. H. S. Warren, American Telephone and Telegraph Company.

Hazards of High Tension Lines. Bryce E. Morrow, Chief Engineer, Utilities Mutual Insurance Company.

Hazards of Gas Works. J. B. Douglas, Manager, Claim Department, United Gas Improvement Company.

Hazards of Street Work. Edward C. Spring, Assistant to the President, Lehigh Valley Transit Company.

Education of Street Car Platform Men. Rex D. Billings, General Claim Agent, Reading Transit and Light Company.

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Wednesday, October 20, 1915, and Thursday, October 21, 1915

RAILROAD SECTIONAL MEETINGS, 9 a. m. to 5 p. m., October 20, and 9.30 a. m. to 12 Noon, October 21.

Chairman, Marcus A. Dow, General Safety Agent, New York Central Lines.

Remarks by Chairman.

Ten Minute Talks:

Discussion of address "Public Safety and the Railroads," made by Mr. W. C. Wilson, Claims Attorney, D. L. & W., at General Session, October 19.

"The Value of the National Safety Council to Railroads Safety Organizations." R. C. Richards, Chairman, Central Safety Committee, Chicago & North Western.

"Automobile Grade Crossing Accidents—What can be done to Check this Fast Growing Peril?" J. C. Rose, Chief Claim Agent, Pennsylvania Railroad Company.

"The Value of Prizes or Awards to Committeemen, other Employes or to Divisions and Shops for the Purpose of Stimulating Interest in Safety Work." W. C. Wilson, Claims Attorney, D. L. & W.

"What Is the Best Way to Create and Maintain Interest in Safety Work Among the Members of Safety Committees and Employes in General?" W. B. Spaulding, Claims Attorney, Frisco Lines.

"What Is the Best Method for Reaching Non-English Speaking Foreign Employes in the Conduct of Safety Work?" Isaiah Hale, Commissioner of Safety, Santa Fe.

"The Value of Moving Pictures in Safety Work—What Plan Could Be Devised for Procuring Effective Films?" C. H. Blakemore, Chairman, Safety Commission, Norfolk & Western.

Wednesday, October 20, 1915

TEXTILE SECTIONAL MEETING, 9 a. m. to 12 Noon.

Chairman, John Calder, Willett, Sears & Company, Boston.

"Safety Provisions in the Textile Industry Abroad."

Ten Minute Discussions:

Present Status of Textile Safety Provisions in This Country. Joseph R. Grundy, President, Wm. H. Grundy & Co., Bristol, Pa.

Hazards of Openers, Pickers, Cards, Etc. W. C. Swallow, Amoskeag Manufacturing Company.

Drawing, Spinning and Weaving.

Dyeing and Finishing. Henry A. Hale, Jr., Manager, Bureau of Safety, American Mutual Life Insurance Company, Boston.

Cleaning Textile Machinery in Motion. Mrs. Annie Leisenring, Inspector, Department of Labor & Industry of Pennsylvania.

The Need of Safety Standards for New Textile Machinery. David S. Beyer, Manager, Accident Prevention Department, Mass. Employes Insurance Association.

Wednesday, October 20, 1915

MEDICAL SUPERVISION AND CARE OF EMPLOYES SECTIONAL ROUND TABLE MEETING, 2 p. m. to 5 p. m.

Chairman, Dr. Otto C. Geier, Cincinnati Milling Machine Company.

Systems of Health Supervision (description and scope of various systems now in actual operation). Dr. George M. Price, Director Joint Board of Sanitary Control, New York City.

Practical Experience with Methods of Health Supervision. Dr. W. H. Clarke, Norton Company, Worcester.

Results Accomplished. Dr. Sidney A. McCurdy, The Youngstown Sheet & Tube Company.

Standardization of Systems of Medical Supervision. Dr. J. W. Schereschewsky, United States Public Health Service.

Standard Forms for Recording Medical Data. Dr. Emory R. Hayhurst, Director, Department of Occupational Diseases, Ohio State Board of Health.

Medical Supervision for Small Plants—Suggestions for Combining Several Small Plants Under One System. Dr. F. D. Patterson, Director, Accident and Sanitation Department, Harrison Bros. & Co., Philadelphia.

Some of the Objections to Health Supervision, Including Suggestions for Caring for the Physically Unfit Workmen. Dr. Alice Hamilton, Hull House, Chicago.

Contents of First Aid Outfits—List of Minimum Contents Desirable. Discussion of Industrial Hygiene Committee's report.

Organization of Systems of First Aid in Plants. Dr. Lloyd Noland, Superintendent, Department of Health, Tennessee Coal, Iron & Railroad Company.

Means and Desirable Extent of Instruction of Workers in First Aid. Dr. M. J. Shields, American Red Cross Association.

Wednesday, October 20, 1915

SAFEGUARDING OF MACHINERY ROUND TABLE SECTIONAL MEETING, 2 p. m. to 5 p. m.

Chairman, Robert J. Young, Manager, Department of Safety and Relief, Illinois Steel Company, Chicago, Ill.

Ten Minute Discussions:

The General Subject of Safeguarding Machines and Tools. J. M. Woltz. Safety Director, Youngstown Sheet and Tube Co.

Construction of and Cost of Making Safeguards in Shops. Harry Guilbert, Chief Safety Inspector, American Car and Foundry Company.

Safeguards for Abrasive Machinery. E. B. Tolsted, Safety Engineer, Independence Inspection Bureau.

Safeguards for Air Compressors. William P. Eales, Safety Engineer, Travelers Insurance Company.

Punch Press Safeguards. S. V. James, Mechanical Engineer, Casualty Department, Underwriters' Laboratories.

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Annealing and Inspection of Crane Chains. Earl B. Morgan, Safety Engineer, Commonwealth Steel Company.

Crane Safeguards. J. Claude Smith. Chief Safety Inspector, Inland Steel Company.

Wednesday, October 20, 1915

BANQUET (Informal), 7.00 p. m.

Toastmaster, R. W. Campbell, President, National Safety Council.

Speakers:

M. G. Braumbaugh, Governor, State of Pennsylvania.

Rudolph Blankenburg, Mayor of Philadelphia.

Edson S. Lott, President, United States Casualty Company.

Thursday, October 21, 1915

SECTIONAL ROUND TABLE MEETINGS, 9.30 a. m. to 12 Noon.

9 a. m. to 12 Noon:

Foundry Sectional Meeting.

Medical Supervision and Care of Employes Sectional Meeting (Continued).

Railroad Sectional Meeting (Continued).

Woodworking Sectional Meeting.

2 p. m. to 5 p. m.:

General Round Table Meeting.

FOUNDRY SECTIONAL MEETING, 9.30 a. m. to 12 Noon.

Chairman, Dr. Richard Moldenke, Watchung, N. J.

Ten Minute Discussions:

Foundry Floor. Arthur T. Morey, Assistant to President, Commonwealth Steel Company.

Foundry Yards. George T. Fonda, Safety Engineer, Bethlehem Steel Company.

Handling of Materials. A. L. Clark, Superintendent, Western Foundries, American Brake Shoe & Foundary Company.

Eye Protection. F. G. Bennett, Safety Department, Buckeye Steel Castings Company.

Hand and Foot Protection. B. W. Conlin, Safety Inspector, National Malleable Castings Company.

Lighting, Heating and Ventilation from the Standpoint of Safety. W. A. Herron, President, Duquesne Steel Foundry Company.

Thursday, October 21, 1915

WOODWORKING SECTIONAL MEETING, 9.30 a. m. to 12 Noon.

Chairman, E. K. Prichett, Secretary, The Macey Company, Grand Rapids.

Ten Minute Discussions:

Interesting the Manufacturers in Accident Prevention Work. Francis D. Campau, Secretary, Furniture Manufacturers' Association, Grand Rapids.

General Hazards of Woodworking Industry. William Newell, Safety Engineer, State Insurance Fund, New York.

Saws and Shapers. J. A. Robertson, Manager, Safety Works, Eastman Kodak Company.

Planers and Joiners. F. A. Barker, Manager, Safety Department, Lumbermen's Mutual Casualty Company, Chicago.

Matching and Molding Machinery. Willard Warner, President, Chattanooga Coffin & Casket Company, Chattanooga.

Lumber Yard. H. M. Taliaferro, Production Superintendent, American Seating Company, Grand Rapids.

Disposal of Waste Material. C. J. Hicks, International Harvester Company.

Thursday, October 21, 1915

GENERAL ROUND TABLE DISCUSSION, 2 p. m. to 5 p. m.

Chairman, C. W. Price, Assistant to the Commission, Industrial Commission of Wisconsin, Madison, Wis.

General Meeting of all Sections to Discuss: "How to Educate the Workman."

MOVING PICTURES, 5 to 6 p. m.

Note.—Any of the Sectional Meetings may be adjourned until Friday to continue discussions, if desired.

UNDERSTAND THE MACHINE

In a southern fibre mill, the conveyorman, with other employes, was engaged in cleaning up the wood room. The operator of the slab-barker was absent from his machine, and the conveyor-man, being desirous of learning how to run it, picked up a stick of wood and attempted to bark it. The result was that the conveyor-man, inexperienced in the use of the machine, lost four fingers. A workman should not attempt to operate a machine without understanding its mechanism.

RAILWAY FIRE PROTECTION

The second annual meeting of the Railway Fire Protection Association is to be held at the Hotel La Salle, Chicago, October 5, 6 and 7. Committee reports are to be presented on the following named subjects: Fire Prevention and Protection in Coaling Stations, Fire Prevention and Protection in Grain Elevators, Fire Prevention and Protection in Terminal Classification and Storage Yards, Cotton Hazards, Oil Burning Appliances, Hand Fire Extinguishing Apparatus, Electrical Hazards, Locomotive Spark and Ash Pan Hazard, Fire Prevention and Protection in Stations, Freight Depots and Warehouses. F. A. Silcox, United States Forest Service, is to deliver an address on "The Railroads and Forest Fires."

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"THE MAN ON THE JOB"

COMPETITIVE ARTICLES RELATING TO THE PREVENTION OF INDUSTRIAL ACCIDENTS BY EDUCATION OF WORKMEN, METHODS OF MANAGEMENT AND MECHANICAL SAFEGUARDS

No. 187 THE PERSONAL APPEAL FOR SAFETY.—Today a great deal of attention is being directed toward safety. The fruits of this attention are shown in the decreased number of accidents where any systematic campaign has been instituted. This is quite in contrast to former years, when laborers, and even officials, granted that a large number of accidents were bound to occur. The industrial world now realizes that it is a very small percentage of accidents which is not preventable by some prior precaution. And it is not entirely a dream to state that the day is coming when a preventable accident will be a disgrace to an industrial plant.

The means to bring about safety are unlimited. They are all good and have their application and effect. But the purpose of all, you will grant me, is the same, viz., to drive home to the individual the correct idea of safety, to get his co-operation, and to get him to think of his own and others' welfare—in short to make him a booster for safety.

The greatest help to obtain this result, and one which is almost entirely ignored, is the personal appeal for safety. The individual must be your starting point—the first unit. And so your appeal must be directed by word to him.

True, the superintendent cannot talk separately to each individual in a large plant, but he can make his appeal to the department heads, they can talk to their foremen, and the latter in turn to their men. Thus you will make it a personal matter. With your department heads and foremen enlisted and boosting, see to it that the men or laborers are approached in the right way, and that the proper points are emphasized. Many of the men can hardly comprehend, and care little of the direct and indirect losses to a corporation from accidents. But, above all, show the individual workman his own personal loss in case of accident. Even if all the bills are paid and a liberal compensation given, show that it does not pay to take a chance of going through life handicappel by an injured body. If the man is married and has children dependent upon his earnings, you can strengthen your appeal by mentioning the possibility of their want.

Impress upon the foremen never to overlook a man's needless exposure to danger. That is the best time to talk safety. Do not censure; explain, show the right way. It will not take long for the men to see that the company is concerned and sincere in its efforts. The men will feel that the foremen are taking a personal interest in the welfare of those in their charge.

Of course, you will find some individuals who will continue to violate safety requirements. These men must be eliminated. But you will find them few if the plea for safety is put in the right way.

Do not say that this is theory. In working along this method of approach, I have seen the expression on men's faces change from surprise to that of understanding and willingness to cooperate. I have seen men pass the suggestions along to their fellow workmen.

At the sake of repetition, the greatest single aid, and that which should be attempted first and kept up all the time, is the *personal appeal for safety.*

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No. 188

The beginner in an accident prevention campaign is usually at a loss as to the proper method of procedure. Unless he has devoted much time to a thorough study of the situation or has hired the services of an experienced man to conduct the campaign, he will naturally be perplexed about the start.

One of the finest features of the present widespread movement for safety is the co-operation shown by the men who are leaders in the movement. The majority of manufacturers who have made or are making a success in the prevention of accidents are willing at all times to supply information to responsible persons seeking for it.

The information that a beginner should seek should be "what has been done" rather than "what is being done." It is impossible to start a campaign with the same methods that are in use at a plant where the doctrine of accident prevention has been preached for two or three years. Wherever accident prevention has been successful, success has come after hard, strenuous efforts to instill the doctrine into the minds and hearts of the workers. A knowledge of the first efforts and failures will be of wonderful assistance to the beginner, whereas a mere knowledge of present methods can only be of use to him later on.

One of the first plans to receive consideration should be the formation of a safety committee. The committee should be fired with enthusiasm for the work. The best way to make a "Safety First" enthusiast is to supply your prospect with all available reading matter and statistics on the subject.

Ostentation before definite plans have been decided upon and ready to be carried out is to be avoided, lest before the seeds be sown, the first efforts are turned into a joke. A certain amount of ridicule is, of course, to be expected at the start, but it certainly is not necessary to provoke a storm which may have an injurious effect for even a short time.

Premature display of signs with slogans and maxims such as "Safety First," and "Personal caution is the best safeguard after all," should be carefully guarded against. It should be remembered that they are only reminders. Their full significance can be appreciated only after the education in safety matters has progressed sufficiently to induce reflection when they are read.

Although it has been proven that unguarded machinery is the cause of comparatively few accidents, still this part of the work should certainly not be neglected. It has an undoubted moral effect on the men and is an expression of good faith on the part of the employers to undertake their part of the work. It is the writer's personal opinion that a substantial wire mesh or expanded metal guard has certain advantages over a solid cast guard installed by the manufacturer of the machine. All parts can be inspected readily without the loosening of a screw, and oiling can be done in most cases by simply projecting the spout of the oil can directly through the mesh. Guards should be reinforced at the corners with angle iron and at all openings with metal strips. Wherever adjustment of parts is necessary, hinged doors should be provided. The doors should be gravity closing or open in such a way that they will be in the operator's way when open, to insure their being closed when not needed. Doors should be constructed of same material as the guard, reinforced on sides with metal strips and provided with a latch or similar locking device to prevent unnecessary vibration. The guard should be given a good coat of paint when completed.

The beginner should realize that he has a real job ahead of him. The men will not "fall" immediately when a few bulletins are exhibited on the board and a number of signs distributed at dangerous points. It takes a lot of "hammering" and "showing" to bring home the truth and get results. And like the young suitor who received "nay" for his answer from his prospective father-in-law because he could not supply his heart's choice with the same comforts the father provided for her—he should realize that "It is pretty hard to start in where the old man left off."

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No. 189 The writer has inspected factory hazards for fire prevention and the safeguarding of machinery for about four years, and a review of that period's activity leads to the following thoughts:

An axiom of safety inspection should be that our energies be directed to the labors of education among the operatives, and to instill in them its direct, momentous consequence.

Most of the employers, especially the larger manufacturers, either for human or economic reasons are, at the present time, in a receptive mood to accept safeguarding suggestions and to adopt measures that lead to the conservation of human energy.

Many of the employes, and especially the older operators, scoff at the idea (as it appeals to them) of a rank outsider coming into their realm, where they have been working for many years, and who, through good fortune, rather than better judgment, have escaped personal injury. The misguided veteran, reactionary to the greatest degree, refuses to permit his machine to be guarded, or cunningly and secretively removes the safeguard until some day the inevitable happens. Perchance he loses a finger, a hand, an arm, or sustains some other permanent or temporary injury.

The writer's experience, no doubt in common with my associates "on the job." has been an endeavor to reason with these men, to illustrate how accidents have occurred, learning from investigation in field practice, and to emphasize the dangerous features of the machine or the specific work—to drive home to the operator what it would mean for his family if he were relegated to the scrap-heap, and to emphasize the fact that no compensation could possibly reimburse him for the suffering incidental to injury, laying stress on the point that his duty to his family and to his neighbors' demand that his best efforts be directed to protecting himself and his fellow worker against accidents.

In my travels it has been my good fortune to meet a condition which overcomes apathy, and if the practice which is in vogue in that factory were applied to other plants it would, without doubt, be productive of beneficial results.

The factory which I have in mind employs approximately 200 operatives. The general manager, superintendent and foremen constitute a committee to pass on suggestions. Any employe in the plant may submit, either orally or in writing, a suggestion for factory betterment, and every three months the committee awards three prizes, the first $15, second $10, and third $5. This means an expenditure of only $120 per annum for the firm. The suggestions may include anything relating to factory betterment, covering efficiency in manufacture, safeguarding of machinery and kindred subjects.

The firm receives direct economic benefits and, from a humane viewpoint, it is doing a most commendable work. The result has been that every man in that shop is a "Safety First" convert, and the *esprit de corps* has been vastly increased.

This line of action keeps the men on their *"toes,"* it makes them *think,* and the material reward offered gives it a *punch* that means something tangible, besides bringing with it the pleasure of being posted on a bulletin board for three months as a prize winner.

Inspection today means *diplomacy,* and in conversation with factory executives, it appeals to the writer that my colleagues "on the job" could suggest a system of reward in such manner as to convince factory managers of the advantages of its application to promote efficiency.

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No. 190 THE SAFETY ENGINEER, "THE MAN ON THE JOB," AND SOME OF THE THINGS HE ACCOMPLISHES.—We safety engineers in our work come in contact with many different types of men in charge of different branches of business. We find in one plant today men in charge who want to see and know every point that can be changed or guarded in the plant that will reduce the liability of industrial accidents, and these men will do all they can to rectify any defect that the inspector points out to them. On

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the other hand, in another plant, the next day, we come in contact with men in charge that will try and cover up defects in order to keep us from seeing them and if, by chance, we find them anyway, the man in charge will put up a big argument with us against making a small change or installing a little guard that possibly would save the life or limb of some employe. Then it is up to the inspector to convince that man that the argument for safety is in his favor as well as the insurance company the inspector represents. And this is quite an uphill job at times. Generally when you outargue a man of this type, and he agrees to make the change or install a guard, nine times out of ten when you next visit the plant you find that he has installed some old makeshift that he thinks will satisfy the insurance company—a device that is absolutely of no service and is worse than nothing at all. Employes will depend on the makeshift to a certain extent and the first thing they know the thing has given way and they are badly hurt. I have found men of that kind many times and have had just such things happen in plants I have visited. I call to mind an instance in one of the largest meat packeries in the South. I was inspecting the plant and there were quite a lot of overhead belts in the canning factory that were unguarded. I called the attention of the manager to these belts, and he put up a strong argument against the installation of any guards, but I sat up with him on the subject until he agreed, finally, to guard the belts.

The next time I visited the plant I went to the office and he was glad to see me. He came at me, full of conviction, and said he had guarded the belts and he wanted to show me where he was worse off with the guards than when the belts were running naked. We went out and he showed me the guards (or makeshifts) and went on to explain why they were not desirable. After he got through I said, "Sir, I certainly agree with you. I, myself, would not like to be in your office with such a makeshift as that under the belts." And I said, "I am surprised at you, the manager of one of the largest packeries in the country, wasting money in such a manner. If you had put what all six of those makeshifts cost into one good guard you would have done something that would have been of some service and at the same time lessen the liability of accidents; but you have made a bad matter worse and I would certainly advise the removal of all these death traps." So, by making fun of the things he called guards, I converted that man to

Guard for a Perpendicular Cutoff Saw.

the "Safety First" idea. And the next time I visited the plant he was pleased to show me what I pronounced SOME guards. He had installed guards under 6-inch belts that no 12-inch belt could have possibly disturbed if it had gotten wrapped all round it. Here was a case of a man who knew how, but he did not want to do it. The inspector was The Man On The Job to fight for the insurance company and accomplish his object. In another case, in the same town, in the operation of a box factory and machine shop, they wanted to do all they could to reduce their accidents, which

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were numerous. But they did not know how to go about it. I visited this plant at the noon hour, discussed the matter, and drew safeguards on pieces of dressed lumber for the foremen and the employes. They set about manufacturing their own guards. I visited this plant at various times and always offered all the assistance I could in making their guards. Now this is one of the best guarded plants in the South. They have lowered their accident list, that is to say, their avoidable accident list, to a minimum.

I am enclosing, as an illustration, a photograph of a guard made in this plant, devised by the foreman and myself, for a perpendicular cutoff saw. It can be seen from a glance that it is a rough affair, but that is not important in this case as the men were trying to do something. This was another case of the inspector being The Man On The Job, accomplishing the things he desired.

There is more or less responsibility on the inspector in all cases, but in some cases and localities more than in others —that is as far as finding defects and getting them put right. But there is one responsibility that rests upon the inspector at all times and that is convincing the foremen and superintendents in the plants he visits that the greater part of the responsibility for industrial accidents rests upon them. If the inspector accomplishes that I venture to say that the next time he visits the plant there will be some changes or alterations, or some guard installed. I consider this one of the most essential parts of the inspector's work. If we would all get in line on this point it would not be a great while until we would have many intelligent men working with us trying to fight down the things that only a few are trying to fight down at present.

PRIZES FOR AUGUST ARTICLES

First Prize. No. 186. M. E. Arkills, Safety Engineer, The Pullman Company, Pullman, Ill.

Second Prize. No. 183. W. H. Aldrich, Superintendent of Inspections, Southwestern Surety Insurance Company, Denison, Tex.

Honorable Mention. No. 184. William C. Kerber, Inspector, Fidelity & Deposit Company of Maryland, Boston, Mass.

Another meritorious article was contributed by A. Gordon King, Brooklyn, N. Y.

COMMENTS BY MEMBERS OF THE COMMITTEE

Article 184 appeals to me more than any of the others as showing how to effectually obtain "Safety First" results, without upsetting or disorganization. Men must be shown the advantage to be obtained from methods, and when once shown that it is to their advantage, they will continue along the line of safety.

❦ ❦ ❦

My vote is cast for No. 184. Experience has taught me there is no other way so good for finding the invisible opportunities that exist for accidents as by the discussion of accident prevention with those employed in operating machinery or doing work in any line and in any locality where nearly always some method is pursued, at certain periods, that might be changed to more safe methods, and some part of machinery or some situation might require safeguarding that heretofore had escaped the notice of the inspector because of his lack of perfect familiarity with the various methods of operation. Usually a social conversation on topical subjects can be turned into the safety channel, and the desire for "beating to it" usually brings

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out from the operator or artisan some useful revelation. Once the ice is broken continuous effort is made to bring to your attention other situations where improvement might be made. I have found also that prompt action on a suggestion offered stimulates effort and competition to bring others to your attention.

The writer of No. 186 has clearly proven his point, that efficiency may be the result of safety, and I cast my vote in his favor. A man temporarily or permanently disabled, causing him to remain from work, necessitates hiring a new man. With an inexperienced man in the place, the work of the other employes is reduced materially. A larger part of the foreman's time and attention must necessarily be devoted to the new man.

The writer of 183 has produced a very good article and covered the point of personal responsibility in a very able manner. As this is the predominant factor of accident prevention work, I believe he should be given first prize.

I have selected No. 186 for first prize. The writer has given some valuable information as to the cost of training men, the maintenance of a good organization, efficiency, upkeep of machinery, food supplies, ventilation, sanitation and toilet facilities, all of which help to make up a good, human machine. The word "thought" should be well drilled into the mind of every employe, as it is the first step toward safety.

My vote is for 185 for the simple and sufficient reason that the writer gives us practical information instead of theory, and we need more of the practical right now in place of so many ideas.

In my opinion, 183 is the best. In order to prevent accidents every man on the job must be a safety booster, constantly on the alert to prevent accidents to himself and to his fellow workmen.

No. 184 shows that he knows how to reach the man that must be reached with the "Safety First" movement and is convinced of its value not only to himself but to his fellow workmen.

Article 183 is exceptionally well written, and in my estimation should receive first prize.

No. 184 I consider the best article, because to me it seems to be the plan that I would work on to begin on "Safety First," and then I would keep on right along the same lines.

I would give first place to No. 186. Efficiency and safety should go hand in hand, and the writer seems to have a clear conception of the requirements.

CONDITIONS OF COMPETITION

SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.

The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of and interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.

The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.

Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.

Contributors are requested to be as concise as possible. Articles should not exceed the limit of 800 words. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.

Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.

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The sooner all foremen can be brought to see the relationship between safety and the maximum production, the sooner accidents will decrease. There are still a few foremen who insist that they cannot bother with too much safety, if they are to maintain the required production. I also agree with the closing lines, favoring a campaign of education, outlined to meet the requirements of the individual shop.

Article 183 receives my vote for the first prize. The writer clearly shows the necessity of training men for any position where there is any chance of injury and the advantages to be gained thereby. If every man could realize that the prevention of accidents and injury is a personal matter and act accordingly as the occasion requires, the "Safety First" problem would be well nigh solved.

In choosing No. 186, I am particularly struck by the phrase, "to lead him (the workman) to a habit of thought." This phrase seems to contain all the explanation necessary as to why we are interested in educational accident prevention. If we can get the employe to think, we have accomplished what we started out to do. It is natural to suppose that any one who has made it a habit to think before doing anything will prove a safe, a careful and consequently an efficient worker.

Article No. 183 is my choice. The writer has given the heads of all branches of industry, manufacturing and travel a chance to search into their own business and make the way safe for every one concerned.

My vote goes to 186 because it strikes a note in safety work of general application. We do not always link safety precautions with efficiency results, but there is no doubt but that they are closely related when our attention is called to it. In our plant we struck this same note by asking the men, in our monthly safety bulletin, "What would you think of the efficiency of the management if they had a crew of nine men standing around in one bunch every day in the month doing nothing." Yet this is just what our July accident toll amounted to, and it was not an especially bad month either—no fatal or permanent injuries and only 14 accidents in a total of over 160,000 hours.

My vote is cast for 184. The safety inspector who sees all kinds of shops with their various conditions is The Man On The Job when he can show workmen and convince them of the necessity of safeguarding. Men often work on some machine or in one shop for a number of years without being injured. It is up to the man who knows how the other fellows have been hurt to explain to the individuals who have not had the opportunity of hearing of such cases.

In my opinion 184 is the best article. This man evidently is in close touch with safety appliances and seems to have fine quality in regard to getting co-operation from the men in safety work.

My choice goes to 183 because he advocates the teaching of thinking. Our jobs as safety men will be over when everyone stops to think—and thinks right. The mental condition is father to the act. Think right and you will act right.

No. 183 is my choice for first prize. His article contains an unlimited amount of knowledge and is very comprehensive. For instance, he holds the men who manage plants equally responsible with the man who wheels for safely performing his duty with due regard for the safety of his fellow employes. Then his suggestion for medical examination and training of men before they are permitted to operate machines is very good. How many times have we seen men, hired at the gate, who could not speak English, operating dangerous machines 15 minutes later. Because of wide range

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of knowledge and number of safety suggestions contained in article 183, I feel that the writer is entitled to first prize.

My choice is 186. This article appeals to all managers as well as engineers since, through safety, the writer shows that efficiency is also gained. This one point is a very important factor to all manufacturers who wish to have their plants equipped to the very highest standard.

I vote for 186. By educating the workman to a degree where thought precedes action, a large percentage of accidents will be eliminated.

I like No. 183. His last sentence, "Each workman on the job should be a safety engineer." To get the co-operation of the workmen each man should be an inspector of safety for himself. If a man bears this sort of attitude toward his work, his fellow workman may fear no injury through his negligence or indifference toward safety.

DEFECTIVE STAIR TREADS

An examination of causes of accidents which were reported to the Department of Labor and Industry, Pennsylvania, during 1914 shows that 3,437 were caused by slipping or tripping. Accidents of this nature are generally due to inequalities or unevenness in the floors, passageways, stairways, etc. Frequently, inspectors of the department notice, as they make inspections in various establishments throughout the Commonwealth, that there are very many stairways in a dangerous condition. In some cases, owing to the nature of the establishment, material has been deposited on the steps which makes them uneven. In many instances wooden stairways are found to be so worn by the constant tramping of many feet that the treads in some portions are almost worn through. As this worn-out condition is found usually on the front edge of the tread, many manufacturers have corrected this condition by reversing the treads and using the underside.

The danger which such irregular and uneven surfaces occasion is very seldom realized by the owners of the buildings in question until the matter is called to their attention. Many accidents have been caused by such defects, and, for that reason, the attention of the public is directed to this dangerous condition found in so many places. Frequently, where such conditions exist, no hand rails have been provided, and a person tripping on the steps would have nothing to grasp in order to regain his balance. A slight misstep on a stairway without a handrail might generally result in a serious accident, while a similar misstep on a stairway provided with a handrail might have no serious result.

Iron or stone stairways, the treads of which have been worn smooth, are often as serious a menace to safety as ones with defective treads. This condition should also be looked after and means used to correct the defect. In some cases, this may be done by roughing the surface of the steps by suitable methods, or else by covering them with material of a "non-slip" character.

The Department of Labor and Industry of Pennsylvania urges all owners of buildings, where employes or the public are accustomed to using the stairways of such buildings, to see that the stairways are maintained in a safe condition and are provided with handrails. Where stairs are less than eight feet in width, handrails should be provided on each side; and where the width is eight feet or more, center handrails should be provided. If these suggestions are carefully carried out, there will be fewer accidents upon stairways in industrial establishments and public buildings.

Accidents are or should be unusual happenings, and education consistently followed out will eliminate them.—*H. H. Matthieson.*

"Safety First" is in the air. It is not a fad, but a fact. The man who does not accept facts is behind the times.—*W. H. Aldrich.*

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"THE FIGHT AGAINST FIRE"

COMPETITIVE ARTICLES RELATING TO THE CONSERVATION OF LIFE AND PROPERTY BY FIRE PREVENTION AND DEFINING FAULTS OF CONSTRUCTION AND HAZARDS OF PROCESSES

No. 71 THE MENACE OF THE GARAGE.—Has it ever occurred to you that the old saying "Every rose has its thorn" is in a way exemplified in the automobile? That is, the enormous increase in the number of these vehicles in use has likewise enormously increased the fire hazard and, therefore, must have contributed largely to swelling the sum total of dollars that each year go up in smoke. All well-conducted cities, towns and communities in some way or other regulate the storage and handling of gasoline, yet from the very nature of the distribution of the automobile, which by recent figures of manufacturers has been shown to be extending rapidly to rural communities—60 per cent of automobiles now sold go to the country—little or nothing is done to compel the owner to protect himself from himself. In fact the crime of lack of protection is equally prevalent in the cities. Within the Chicago city limits, during the first six months of 1915, there were 42 garage fires; there were also 82 fires resulting from the presence of petroleum or some one of its products.

Building departments and insurance companies should in some way combine their efforts so that where the authority of one (building department) did not apply or cannot be extended, the authority of the other (insurance companies) could compel the construction of fireproof shelters for automobiles.

Many of the commercial garage operators, in fact most of them, are guilty of the same disregard for the added fire risk resulting from the storage of inflammable oils and gases as is the private individual. "No smoking" signs soon fail to attract attention. Familiarity seems to breed contempt. The commercial garage is usually built with concrete floor and brick, tile or concrete walls, the whole structure being roofed with timber construction that defeats the possible benefits that might accrue from the fireproof or fire-resisting material used in the remainder of the structure.

Compel the building of truly fireproof garages!

❦ ❦ ❦

No. 72 FIRE DRILLS IN INDUSTRIAL PLANTS IN SMALL TOWNS.—Fighting fire in industrial plants differs greatly according to location, size of plants, etc. For instance, fire-fighting in cities like New York, Chicago, Buffalo, and similar places differs from smaller places having large industrial plants and having a volunteer or inadequate department.

In large cities the organization is complete. The ability of those in charge and their authority enable them to handle their corps of fire-fighters to the best advantage. There is no confusion and contradiction of orders because there is always a system of rank and the one in charge of operations gives his orders and his word is law until a higher authority appears and takes charge. But, consider a small community with a large industrial corporation. Let us suppose this establishment has a fire, the fire is gaining headway on the plant force, the local fire department is called and when they arrive the local fire chief takes charge. Immediately there is confusion, as in most cases the shop forces will not take orders from the department man, but

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will only take orders from their own shop chief. This chief, in most cases, is so impressed with his own importance that he will not take orders from the local man. In the end it may be necessary to send some distance to a city for help. More confusion. After the fire is out each tries to put the blame on the other, and hard feeling results.

Now, I think that if the matter of holding fire drills in industrial plants in small towns and suburban communities were made more like an actual fire, coming unexpectedly (in one plant that I know of the tip goes through the shop a week ahead of time and all are expecting it) better results could be obtained in saving life and property. It would cost a trifle more but in the end I believe the efficiency and additional security given the employer would justify the expenditure.

To secure these results I would have the usual fire drill at least once a month, and periodically, say, three times a year or every six months, would have a fire drill and make arrangements for having the local department present, the fire supposedly in a certain part of the plant. The local chief would take charge of fighting the fire and getting out the hands that are supposed to be cut off from the usual avenues of escape.

In this way the chief of the local department would become acquainted with the topography of the plant. He would become familiar with passages, pumps, hydrants, gates, etc.; also he would become acquainted with the plant department. They would obey his orders without question and work in harmony with him and with the knowledge gained by being familiar with each other the two departments would really be one and stand more chance of successfully fighting a fire should one actually occur.

The local chief might also be able, and only too glad, to give the firm advice as to improving the plant drill system, the equipment for fire fighting, the handling of apparatus, the most convenient place to keep same, etc.

I believe it would, after a year or so, be necessary to have the local department present only about once or twice a year.

CHILD EDUCATION AS FIRE

No. 73 PREVENTION MEDIUM.—For several years the study of fire prevention has been a subject of interest to the adult, but only in more recent years has it been a study to which the mind of the child has been directed, yet the child is the medium through which millions of the people of the United States must be reached. In the training of the child's mind in matters of fire prevention you are training the future man or woman, and the child will carry the lesson which it has learned at school home to the parents, where its influence will be communicated to the adult.

Few States have adopted a text-book on the subject of fire prevention and have laws making it compulsory to teach the same, yet it should be the law of every State which desires to conserve its natural resources and the resources of our nation and to protect its citizens against the large waste of property from the ravishes of fire.

In the lessons of fire prevention the child should be taught that the match as a plaything is as deadly as the rattlesnake and more dangerous, because it gives no warning until it shoots forth its deadly flames and ignites the child's clothing. It should be taught that death and destruction lurk within the small tip upon the end of the stick which they have been taught to call a match.

When we desire to raise the standard of citizenship of a State or Nation we do so by the education of its people, and we do not start with the adult, but we use the child. If the education of the child is necessary in raising the standard of citizenship, is it not essential that the child be educated in the matter of fire prevention if we desire to relieve our nation of the large ashheap?

The child that has been taught that it is better to throw a shovel of sand than a bucket of water on an oil or gasoline fire which is just starting has the knowledge that may save a destructive fire by the use of the former method, instead of spreading it by the use of the latter. Likewise the assistance of the child that has been taught to extinguish the flames from burning clothing by rolling the party in the dirt, or by smothering the

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flames with a woolen coat, blanket or rug, is more valuable than that of the adult who leaves the person whose clothes are on fire and runs for the doctor.

Organize the children into fire prevention clubs and start an educational campaign and they will assist in the elimination of the trash and rubbish which cause so many fires—they will assist the removal of many of the common hazards, such as defective flues and defective stoves, the careless handling of oil and gasoline.

Children are imitators and if the adult is careless the child will be likewise, unless it is taught differently. So if this is true the best method of fire prevention, and the one which I think will have the best and most lasting effect, will be in the education of the child.

❦ ❦ ❦

No. 74

While great work is being done to prevent fires in factory buildings, etc., by appealing to employer and employe, I am of the opinion that the employe is not reached to any great extent, for fires in such places do not touch him personally enough, outside of the possible danger to his life and probable loss of wages. Therefore, I would suggest that all companies in all fire departments have a competent fireman inspect all dwellings in their respective company districts, going directly and separately to the occupant of every floor and after making a careful inspection, explain to the occupant the danger of the various articles they have therein, such as kerosene heaters, combustible cleaning fluids, polishes, hot ashes, waste paper, matches, rags used for cleaning purposes, swinging gas brackets, misplaced scuttle ladders, locked scuttle covers, smoking in bed and on couches, encumbering fire-escapes, use of kerosene oil in lighting stoves, stovepipes through wooden partitions, soot in chimney, etc. In each case the fireman should explain the particular danger attached thereto, how the same may be avoided by proper handling and what to do in case of fire from each. Thoroughly explain that a little carefulness by each person will greatly reduce the risk to himself and others.

Also have the fireman place a card in each house giving the location of the nearest alarm box and instruct the occupants how the same is operated, for there are many people who are under the false impression that when the bell rings on opening a keyless box they are sending the alarm.

Furthermore they could be instructed in the value of closing doors in rooms in which a fire has been discovered which has already got beyond their control and to promptly send in the alarm.

Of course, this could not be done in a day or a week, but by taking a few houses at a time, the ground would soon be gone over thoroughly. By showing the occupants their danger, they would, in the majority of cases, be only too glad to help themselves and thereby others.

CONDITIONS OF COMPETITION.

To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.

The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.

Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.

In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.

Articles will be received from any person competent to discuss the question of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. Articles should not exceed the limit of 800 words. No consideration of any kind is required for the privilege of competing.

Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.

Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.

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This in my opinion would reach all persons directly and while all would not act upon the advice given, it would cause discussion among them and have a further tendency to make them careful. By being careful at home they would see the necessity for care in their place of business.

The reason for suggesting that firemen do this is that the people as a rule respect the firemen and when a fireman gives advice they know it comes from one who understands the actual conditions better than an ordinary citizen inspector. Hence they would give heed to his warnings.

PRIZES FOR AUGUST ARTICLES

First Prize. No. 70. Ralph E. Richman, Deputy State Fire Marshal, Indianapolis, Ind.

Second Prize. No. 66. Peter P. Dalton, Fireman, First Grade, Engine Company No. 286, New York Fire Department, Glendale, Queens County, N. Y.

Honorable Mention. No. 68. William P. Murphy, Fireman, First Grade, Engine Company No. 39, New York Fire Department, New York City.

Other meritorious articles were contributed by H. Holzberger, Fireman, Hook & Ladder Company No. 124, New York Fire Department, Brooklyn, N. Y.; John J. McMahon, Lieutenant, Engine Company No. 88, New York Fire Department, Bronx, N. Y.

COMMENTS BY MEMBERS OF THE COMMITTEE.

My vote is for 68 because the writer tells us of fires in homes. In this part of The Fight Against Fire, it is the most important, as the statistics of fires show that most fires occur in homes. No. 68 tells of the precaution people should take to guard against fire and the dangers that neglect may cause.

No. 68 is entitled to first prize. The article, "Fires Originating in Tenement and Apartment Houses," is very good, and shows that the author has knowledge of the subject, bringing out the facts in plain language. Educating the tenement dwellers in fire prevention, is badly needed.

I vote for 70 because the writer draws attention to a phase of fire protection concerning which many people are seeking information, some of them unsuccessfully. The author himself, although evidently acquainted with modern principles of lightning protection, fails to recite them. However, he has accomplished a useful purpose in advertising the fact that there *is* a method of lightning protection so satisfactory that it will secure a reduction in insurance rates.

I vote for 70. This article covers a fire loss that is easily prevented. Any standard rod properly installed will do the work and do it well. The writer's suggestions are good, although, I believe, he is in slight error in the statement that prejudice against the rods has been brought about by exorbitant charges by rod companies. I rather believe the prejudice has been aroused by the failure of the rods to do their work, on account of the improper manner of installation. You cannot stick the end of a rod into the ground and expect it to do its work. Failure of rods through improper grounding has done more to prejudice the people than any other one thing. It is absolutely necessary to have sufficient ground area contact; a good method is to trench and use sheet metal terminal, copper preferred. Of course,

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this means work, and a rod agent will pass it up by driving a pipe or rod, if you will allow him to do so. Conductivity is not of any great importance for lightning rod service; any continuous stranded metal cable of proper size is good, but from a non-corrosive standpoint, copper is to be preferred. Ribbon type is the ideal, but not convenient to install. I believe a properly designed lightning rod rightly installed is an absolute protection against lightning.

I cast my vote for 68 for the following reasons: First, the majority of fires occur in the homes of the people; second, while large fires destroy business industries, the loss there, as a rule, is only financial; on the other hand, fires in tenement and apartment houses often result in a loss of life, as well as of household belongings.

Please accept my vote for 66, for the following reasons: First, the author intelligently discussed the important necessities to prevent fires spreading by "radiation"; second, he clearly explains the precautions adopted to overcome this hazard by effective streams from high pressure system; third, the proper handling of same by experienced fire-fighters.

I vote for No. 67. Nearly all fires are the same size at the start, and in many cases an extinguisher would have checked a fire which resulted in great property loss.

I vote for 70 for first prize. The subject of protecting farm property from fires caused by lightning is one of importance, and should be given a great deal more consideration. The proper grounding of a building renders it practically safe against the electric flashes from the clouds. All buildings standing alone with no protection from the flashes of lightning should be well rodded. Until the lightning rod companies realize the fact that money is not found, and will perform good work at reasonable rates, and all isolated buildings are properly grounded by compulsion, the burning up of such buildings will continue.

No. 66 is an article which covers a broad subject. A great many fire-fighting companies are not as well posted on heat radiation as they should be. Consequently, when called to a large fire, their efforts are many times misdirected. Fire-fighting should be scientifically studied; then all efforts spent in fighting fires will have the greatest effect.

In my opinion 66 is the best. The writer has contributed a very instructive explanation of heat radiation, which is one of the main causes of conflagrations which have visited several of our American towns and cities recently.

I vote for 70 as being the most practical and completely applicable. One chief merit of this article is the absence of any discernible errors, technical or otherwise, indicating very careful consideration of the subject. Comparisons are odious (or "odorous," if one prefers), but the temptation to illustrate is very strong, and this singles out one article simply because it is convenient—not that the criticism applies to that one especially as compared with others. No. 67 suggests one pound of calcium chloride in a 10-quart (net) extinguisher, (whereas a balanced solution to resist — 10 degrees would require almost 9 pounds for that quantity of water) and wholly disregards the chemical reactions. The experiment has been tried out unsuccessfully. A calcium chloride solution extinguisher could be operated successfully by means of some capsule of liquified gas, say carbon dioxide, if some one will only invent a dependable capsule. This is not an error of any special consequence, but it involves the loss of a point in a comparative judgment.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

POWER'S CAMERAGRAPH No. 6B

At a luncheon given by the Nicholas Power Company, at the Hotel Biltmore, New York City, August 24, 1915, at which were present representatives of the leading periodicals in the moving picture world, the Nicholas Power Company formally announced its latest moving picture machine, the Power's Cameragraph No. 6B.

Mr. Nicholas Power, the inventor of Power's Cameragraph, has not only devoted years of untiring effort to producing a machine of the highest projection efficiency, but his inventive genius has also been turned towards minimizing fire dangers in motion picture machines. His efforts have been as successful in this respect as in producing perfect projection.

Mr. Power long ago foresaw the great possibilities of development in the moving picture industry, and devoted the best years of his life to perfecting the mechanism of the motion picture projecting machine. The perfect definition and clearness of the motion pictures of today, as they are thrown on the screen without flicker and with eyestrain eliminated, testify to the success which has been achieved in the design, construction and operation of the motion picture machine.

The Power Cameragraph No. 6B embodies the most necessary and desirable features in modern up-to-date projection and safety. The wide experience and inventive ability of Mr. Power, which cover the development of the motion picture machine from its earliest stages, are embodied in the Cameragraph No. 6B. The stand, entirely new in design, is exceptionally rigid and substantial in construction. It consists of two sections, the lower, which is fixed, being fitted with a central hub on which the upper section rocks, both are securely fastened together by heavy bolts through slots, permitting a tilting of the upper section, which carries the mechanism and the lamphouse. The motor drive and lower construction remain horizontal. The exceptionally fine adjustment is obtained by means of a worm, the control of which is easily accessible, permitting the centering of the picture on the screen even during operation at all times. A simple hand wheel locking device gives additional rigidity to the entire equipment. The take-up is simplicity itself, consisting of two metal disks, one of which is fibre faced, revolving one against the other and running on ball-bearings. The extent of friction surface has been carefully computed, permitting an even and continuous but slightly intermittent tension, causing the film to be wound to the proper tightness on the take-up reel. In test this device has taken up 3,000 feet of film, maintaining an even tension throughout.

The new lamphouse is of very substantial construction, permitting easy access. It has been specially designed with a view of allowing the best possible ventilation. The doors are of double metal with air space between; cooling chutes are provided both above and below the condenser mount, securing a very desirable arrangement. The cooling of the interior of the lamphouse is procured by a duct construction at the top leading to a vent which draws off the heat. Radiation is reduced to a minimum.

The Nicholas Power Company has been awarded grand prizes at both the International Exposition of Safety, New York, and the Panama-Pacific International Exposition.

AUTOMATIC ENGINE STOP

The superintendent of a large industrial plant at Paterson, New Jersey, recently remarked that one of the two most important accident prevention appliances in his entire plant was the automatic engine stop. For many years the Monarch Automatic Engine Stop, manufactured by the Consolidated Engine Stop Company, 350 West 38th street, New York, has been in use in this plant. In addition to the overspeed protection they have many switches located throughout the plant. This superintendent is now negotiating to have the engine stop operate in conjunction with the fire alarm system, for whenever they have a fire drill the instructions are that each man shall release his machine. This suddenly relieves the engine of a very large percentage of the load, placing it in a very dangerous position. If the governor does not take care of this sudden

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change of load on the engine it puts it square up to the engine stop to prevent a very serious accident. Thus double protection is secured by shutting down the engine simultaneously with the sound of the fire alarm horn, with the speed limit ready to act in the event that the fire alarm equipment should fail.

"KOVEN" OILY WASTE CAN

The oily waste can, manufactured by L. O. Koven and Brother, 50 Cliff street, New York, has recently received the approval of the Underwriters' Laboratories, Inc. Oily waste cans should be in use wherever oily waste accumulates. "Safety first" demands that oily waste should never be permitted to be deposited anywhere except in a waste can specially made for the purpose. Oily waste represents a dangerous fire hazard and it is by the use of such cans that conditions of safety are secured in factories, engine rooms and industrial plants.

The "Koven" is a sheet metal can with hinged cover, designed to serve as a receptacle for oily waste, paint cloths, leather scrapings, etc., or for the storage of clean waste. Cans used for oily waste or similar materials should be emptied every night.

These cans are made in different sizes. The main features of interest from a fire protection viewpoint are the construction and reliability in service. After careful test and examination the Koven can has met all the requirements of the Underwriters' Laboratories. The factory of L. O. Koven and Brother, Jersey City, New Jersey, is a large well-equipped tank and boiler works, occupying one four-story building with basement and three two-story buildings. The floor space covered is about 175,000 square feet.

A CORRUGATED SHEET ASBESTOS CONCRETE FOR ROOFING AND SIDING

The weather and fire resisting qualities of Portland cement concrete recommend it as a covering for buildings, but because of its low tensile strength it cannot be used successfully alone except in massive construction. The materials ordinarily used for reinforcing, viz., steel and iron, are in a short time destroyed by water and air which penetrate the thin and more or less porous layer of cement.

Efforts have therefore been made to employ as a reinforcing material some substance which would lend the necessary tensile strength and toughness to the cement, but which would be unaffected by atmospheric influences. Such a material has been found in asbestos.

The incorporation of the asbestos fibres with the cement in such manner as to form a dense, tough concrete, demands special treatment. The problem of successfully making an asbestos cement concrete wherein all the cement particles were thoroughly hydrated and united with the asbestos was solved by Ludwig Hatschek, whose patents are now worked extensively in all civilized countries, the Hatschek plant in Austria alone turning out yearly about 100,000,000 square feet of asbestos concrete roofing material.

Sheet concrete combines considerable strength and toughness with lightness, and besides being incombustible, is also an excellent heat insulator. Shingles prepared in this manner are made in different colors, as the natural concrete gray, slate and Indian red, and have come into wide use for covering residences and other buildings. Due to their light weight they can be used in many places where slate and tile would be inadmissible. Larger sheets are made in various thicknesses from ⅛ to 5/16 inch, and are used not only for exterior and interior building purposes, particularly where fireproofing is desired, but also in the manufacture of many articles where incombustibility, heat and electrical insulation are required, as, for instance, in the manufacture of gas and electrical stoves, switchboards, circuit breakers, refrigerators, soda fountains, letter files, safes, etc.

For covering large surfaces asbestos concrete sheets made up in corrugated form offer greater strength, and the corrugations lend themselves to the ready making of joints where the material is applied as roofing or siding. The problem of manufacturing corrugated sheets was taken up some ten or twelve years ago by interests connected with the Keasbey & Mattison Company of Ambler, Pennsylvania. This concern is now producing corrugated sheet asbestos concrete, a dense and thoroughly compacted structure, which will not only withstand rough treatment, but is unaffected by weather influences. Corrugated asbestos roofing, furnished by the Keasbey & Mattison Company, is being widely used for covering the buildings of steel and iron companies, gas works, elevators, chemical works, machine shops and foundries, warehouses, pier sheds, etc. Its permanent character renders it much more economical in the long run than corrugated iron.

THE UHL SAFETY GUARD

The Uhl Safety Guard is designed for preventing accidents in embossing, cutting and scoring on printing presses. The guard does not interfere with the operator, affords him protection and automatically removes his hands from the press in times of danger. There is no doubt that the efficiency of an operator is increased by the removal of danger, and the operator can then devote all his thought and energy to his work without the strain of continually looking out for danger. Thus, both employer and employe are benefited by safeguarded machinery.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

CABINETS. Aurora Steel Products Co.

DOORS AND SHUTTERS, HARDWARE. Solar Metal Products Co. Three-point locking mechanism for swinging hollow metallic doors.

DOORS AND SHUTTERS, METAL. Solar Metal Products Co. Fire door for opening in vertical shaft.

DOORS AND SHUTTERS, METAL. Solar Metal Products Co. Fire door for openings in corridor and room partitions.

DOORS AND SHUTTERS, METAL. The A. B. Ormsby Co. Fire door for opening in vertical shaft.

DOORS AND SHUTTERS, METAL. The A. B. Ormsby Co. Fire door for openings in corridor and room partitions.

DOORS AND SHUTTERS, METAL-CLAD. Metropolitan Fireproof Door and Sash Co. Tin-clad fire doors and shutters

DOORS AND SHUTTERS, METAL-CLAD. Knoburn Co. Fire doors for openings in corridor and room partitions.

DOORS AND SHUTTERS, METAL-CLAD. Knoburn Co. Fire door for opening in vertical shaft.

DOOR FRAMES, METAL. Solar Metal Products Co. Frame for single swinging door mounted singly or in pairs.

DOORS AND SHUTTERS, ROLLING. The Variety Manufacturing Co. Variety No. 65. Automatically operated rolling steel shutter for exterior window openings.

DOORS AND SHUTTERS, ROLLING. The Variety Manufacturing Co. Variety No. 65. Manually operated rolling steel shutter for exterior window openings.

FIRE PAIL, 11 QUARTS. H. M. Swaim.

GYPSUM BLOCKS, ACME. Acme Cement Plaster Co. Circular cord pattern Supplied in standard sizes.

GYPSUM BLOCKS, AMERICAN IMPROVED. American Cement Plaster Co. Circular cord pattern. Supplied in standard sizes.

GYPSUM BLOCKS, BELL. H. W. Bell Co. Circular cord pattern. Supplied in standard sizes.

GYPSUM BLOCKS, EBSARY. Ebsary Fireproofing and Gypsum Block Co. Circular cord pattern. Supplied in standard sizes.

GYPSUM BLOCKS, KEYSTONE. Keystone Fire Proofing Co. Rectangular cord pattern. Supplied in standard sizes.

GYPSUM BLOCKS, PYROBAR. United States Gypsum Co. Circular cord pattern. Supplied in standard sizes.

HOSE, RUBBER LINED. Hewitt Rubber Co. Cotton rubber-lined hose, either single, double or triple jacketed, and Rubber Hose, all sizes for Fire Department use.

NU-TILE ASPHALT SHINGLE ROOF COVERINGS. Heavy pattern. Amalgamated Roofing Co.

J-M STANDARD ASBESTOS THREE-PLY BUILT-UP ROOF COVERINGS. H. W. Johns-Manville Co. These roof coverings have been shown by test and investigations at Underwriters' Laboratories to afford a high degree of fire protection to roof decks; to be not readily flammable; not to carry or communicate fire to any extent; not to slip from position when heated; to possess little or no flying brand hazard; to exert a considerable blanketing influence upon fires within buildings; to be durable under ordinary service conditions, and to fulfill requirements for classification given.

WATCH SERVICE, CENTRAL STATION. C. E. Potter Electric Signal Co. Potter combination watch and fire box alarm.

WINDOWS. Solar Metal Products Co. Heavy steel metal window glazed with wired glass.

RECENT CATALOGUES OF SAFETY DEVICES AND METHODS

By writing the firms the publications may be obtained without cost.
Please mention SAFETY ENGINEERING.

"Examples."

Mississippi Wire Glass Company,
220 Fifth Ave., New York.

This company has recently issued a book of sixty pages containing over fifty illustrations. It should prove helpful to building owners, architects, engineers and contractors interested in reducing the fire hazard in buildings.

Heavy-Gauge Fire Retardant Windows.

S. H. Pomeroy Company, Inc.,
282 East 134th St., New York.

Illustrated booklet, describing the latest edition to the Pomeroy line of fire windows. This heavy-gauge, double-hung fire window is designed to take the place of the copper-kalameined construction, commonly used for street-front windows, and it is claimed this heavy-gauge window has the advantages of greater serviceability and dependability at lower cost. The lines of this heavy-gauge window show a distinct advance in architectural design over the ordinary hollow metal window.

Home Safety.

Oxweld Acetylene Company,
36th St. and Jasper Place, Chicago.

has issued an instructive publication entitled "Is Your Home Safe?" giving facts and figures from the official records of the State fire marshals of Ohio, Texas, Connecticut, Iowa, Michigan, Wisconsin, West Virginia, Nebraska and Minnesota.

"Square D" Steel Enclosed Switches.

Detroit Fuse & Manufacturing Company,
Detroit, Mich.

Bulletin No. 37 describes the latest switches manufactured by this company, and which have recently received the approval of the Underwriters' Laboratories. This company is now marketing their Iron Clad Switches and Induction Motor Starters, formerly known as the "Detroit" Iron Clad Switches and Motor Starters, under the new name "Square D" trade mark. This company has discontinued the use of "Detroit" as a trade mark, and will in future market all their products except "Arkless" fuses under the new "Square D" trade mark.

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SAFETY ENGINEERING

Vol. 30 OCTOBER, 1915 No. 4

Current Comment and News

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AT YOUR SERVICE!

NEW YORK has been visited by two disasters which are unique in character and magnitude. Nothing similar to them has happened before. The first accident occurred in Seventh avenue between Twenty-fourth and Twenty-sixth streets, where an explosion of dynamite in the new subway caused the street to fall in, from curb to curb, for nearly two blocks, carrying with it a trolley car filled with passengers and a loaded brewery truck. The precipitation was about 30 feet and 8 persons were killed. The second disaster was the collapse of the temporary street decking over the subway construction at Broadway and Thirty-eighth street, carrying into the abyss an automobile and killing one woman. Public opinion is holding the Public Service Commission to a "strict accountability" for these disasters. There is a "watchful waiting" to see that no more undermined streets of the metropolis fall into the subway trenches.

The State Board of Labor and Industries of Massachusetts is being flooded with inquiries from owners and manufacturers as to what accommodations they shall install for persons injured or taken ill on their premises, in accordance with the "first aid" act passed by the legislature last year. Commissioner Edward Mulready says that many of the manufacturers have already provided hospital rooms. The members of

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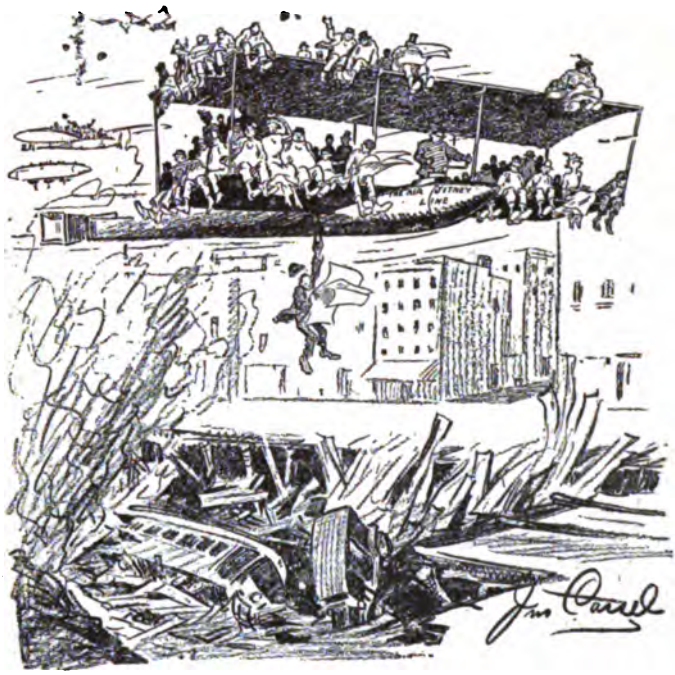

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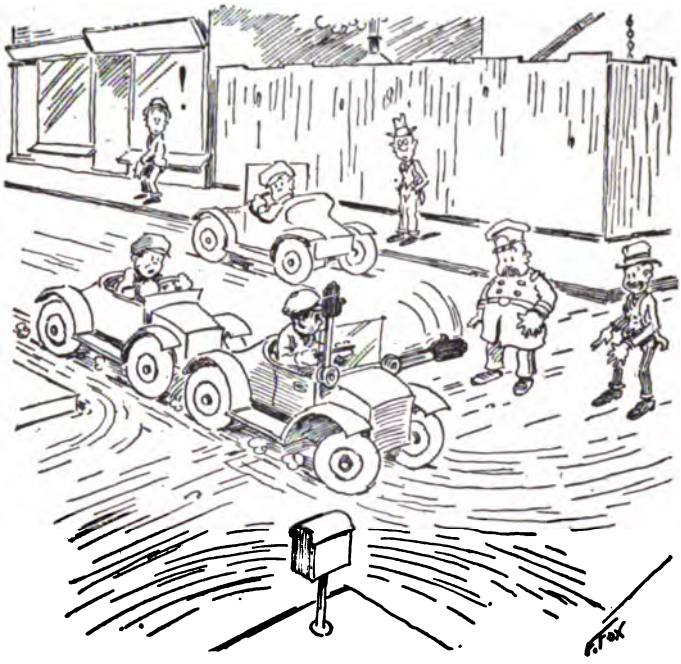
"SAFETY FIRST"



The Evening Sun, N. Y. Copyright, 1915, by the Wheeler Syndicate, Inc.

Why Not a Semaphore System for the Man Who Has to Have Both Hands on the Wheel When Turning a Corner?

the board are at work on suitable regulations for the various kinds of establishments. The original bill provided that manufacturers and others included in the petition should provide hospital rooms, but this provision was modified after a bitter fight in the legislature. The problem for the board is to prepare regulations that will protect employes and will not impose undue hardships on employers. The commissioner said that the board realizes that oftentimes the most important treatment of injuries is that which can be administered immediately after an injury and before a wound has been infected. It is probable that a series of public hearings will be held before the rules and regulations are formulated and put into effect.

"The Teaching of Hygiene and Safety" is the title of a 156-page publication just sent out by the New Jersey State Department of Public Instruction, designed to educate in the prevention of accidents. In the belief that increasing interest in "Safety First" should find expression in instruction and training in the schools, the legislature has made obligatory by law the teaching of accident prevention in public schools of that State. In the monograph, Commissioner of Education C. N. Kendall shows

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that the material has been gathered from the best sources, points out that a course of study is presented which permits teachers and superintendents plenty of latitude, and says that a definite time each week should be set aside for the work. The volume deals with the purpose and method of instruction in hygiene and sanitation, with the care of the eyes, teeth and ears, with dangers in the home, at school, on the street, on the railroads, in occupations, from fires, safeguards, emergency treatment, avoidance of communicable diseases, flies and mosquitoes, alcohol and narcotic drugs. Courses of study for various grades are outlined, and nothing that might be of value appears to have been neglected. Dr. Kendall expresses his conviction that the use of the monograph in the public schools will be of great service in promoting the health and safety of future citizens.

The Indianapolis News.

A QUESTION OF RESPONSIBILITY

Aside from the loss of 55 human lives and $500,000 worth of physical property as the result of an explosion of a 250-barrel gasoline oil tank car at Ardmore, Okla., on September 27, it is deplorable that the cause of the disaster should escape definite solution. Whether the explosion of gasoline was caused by a spark from the blow of a workman's hammer, should be an established fact, and not a matter of conjecture. The men at work repairing the oil tank car having been blown to atoms their explanation is not available, but the plausibility of the theory strengthens as the inherent treachery of gasoline is taken into account. Railroad men state that the car had been "shunted" onto a siding because it was in "bad order." Small streams of gasoline were leaking from the car and a pool of the liquid had formed on the ground underneath. An inspector mounted the car, unscrewed the cap and peered into the tank, when the gasoline immediately ignited, and everybody and everything within 100 yards were destroyed. Dynamite in a freight storehouse was set off by the concussion of the gasoline explosion. E. P. Angus, of Dallas, who has been in the gasoline oil business for more than 20 years, says that the gasoline was not the ordinary commercial gasoline, but what is known as "casing head" gasoline, which is made by subjecting casing head gas from oil wells to high pressure to liquefy it, and then mixing the liquid with ordinary gasoline to secure the gravity desired. This gasoline, he declares, is far more volatile than the ordinary gasoline and much more dangerous, because the gas will explode if there is any fire near it.

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INSPECTING AND BRACING THE SUBWAYS OF NEW YORK CITY

ENGINEERS and investigators, representing the municipal authorities and other bodies have been occupied day and night, since the accidents in September, in studying the dangers connected with the construction of underground railroads in cities, when the streets are carried on temporary structures.

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The Subway Collapse in Seventh Avenue, Between Twenty-fourth and Twenty-sixth Streets, September 22. Eight Persons Were Killed and Many Injured

As a matter of precaution against further accidents of the kind a hurried inspection by the Public Service Commission, at the instigation of Mayor Mitchel, resulted in closing to public traffic Thirty-fourth street and Sixth avenue, Thirty-fourth street and Seventh avenue, Broadway and Twenty-ninth street, Broadway and Twenty-eighth street, Seventh avenue and Twenty-eighth street and Seventh avenue and Twenty-third street. The commission recommended that at these points diagonal cross bracing, both longitudinal and transverse, be installed before traffic was resumed. It further recommended in the Broadway area between Twenty-sixth and Thirty-third streets that each street crossing be reinforced by the installation of diagonal cross-bracing, both longitudinal and transverse, and that the same be installed at one intermediate point in each block.

By way of investigation, Mayor Mitchel appointed a committee including several engineers and city officials, to look into the engineering conditions,

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chiefly respecting the shoring of the false street and paving in the contract work being done by the United States Realty & Improvement Company; to go through all the subway work now being done, study the wooden shoring, ascertain its strength and report to him. While the engineering inspection was under the direction of Nelson P. Lewis, the entire work of the committee was under the supervision of Leonard M. Wallstein, Commissioner of Accounts, who has authority to go into any phase of the conditions that would prove of value either to the mayor or the public.

Reports on the accidents were received shortly by the Public Service Commission, both from the outside engineers, Edmund S. Davis and Henry H. Quimby, and from its own engineers. The former dwelt upon the need for additional precautions in places where the rock is liable to slide, but spoke strongly of the forethought and care shown throughout the subway work. They were convinced, they said, that the public might feel secure against a repetition of the recent accidents. In reporting on the Seventh avenue collapse, John H. Myers, a commission engineer, expressed the opinion that it was the result of a blast. Mr. Davis and Mr. Quimby expressed the opinion that the United States Realty & Improvement Company was using shoring of quite sufficient strength and that the only serious menace to the public lay in the possibility of rock slides, as in Broadway. Much of the rock, they pointed out, was likely to be loosened when exposed to weather, temperature changes and vibrations, and it was often difficult to determine when a slide would occur. So they recommended that whenever there was any risk that the rock might move, special precautions should be taken.

The engineers discussed technically how the shoring might be improved, and made four important recommendations. They suggested that whenever a rock with inclined strata showed signs of disintegration, the shoring should be carried from side to side of the trench and the erecting and concreting of the permanent structure completed as quickly as possible. The timbering should be so designed as to provide continuous struts from side to side of the trench, with the joints of the uprights firmly spliced to prevent buckling. They further asked that periodical inspections of the shoring be made to insure that the timber work was not deteriorating from vibration.

Engineer John H. Myers was of the opinion that the Seventh avenue accident was caused by a blast at the northern end of the cut. This had caused the wooden beams and steel I-beams on which the street was supported, to move toward the south. Then the trolley track, as its supports were pulled away, hung in a curve as though it were a rope, and this helped to destroy the underground structures. So when the disturbance of the track reached the street car it fell into the cut, its weight adding to the force which was driving the supporting structure southward. Consequently the beams, which were supposed to hold up the street, toppled over southward.

Robert Ridgway, engineer in charge of subway construction, in transmitting the report of John H. Myers, agreed that a blast was the initial cause of the accident in the Seventh avenue instance. With J. Frank Smith, assistant counsel of the Thompson Investigation Committee, and Senator R. R. Lawson, a member of the committee, Coroner Feinberg is conducting an inquest into the deaths caused by the Seventh avenue calamity.

In his report to the Mayor, Commissioner Wallstein disclaimed any attempt to decide whether such faults as he found amounted to criminal negligence or to fix personal responsibility, but the physical cause of the accidents he considered was the inadequate supporting structure. The report said: "This timbering consisted of a combination of wood and steel, loosely connected. Above the steel the timbering was arranged to suit the street and sub-surface structures. Below the steel the posts were spaced to give a maximum of facility in excavation operations. Neither above the steel nor below it were there any adequate precautions against transverse or longitudinal displacement of the timbering. As a result, the knocking out of any post below the steel or of any steel beam was sufficient to collapse the whole structure."

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PRESIDENTS OF LOCAL COUNCILS OF THE NATIONAL SAFETY COUNCIL

MARCUS A. DOW, president of New York Local Council No. 14, of the National Safety Council, is general safety agent of the New York Central Lines, and has charge of the safety bureau of that system of railroads. His jurisdiction in safety matters extends over the lines both east and west of Buffalo, covering approximately 14,000 miles of railroad. In addition to his work of conducting a progressive educational campaign among the vast army of railroad employes on this system, he has been prominent in public safety work and has addressed many safety meetings held by chambers of commerce in various cities. He is the author and producer of "Steve Hill's Awakening," a railroad safety drama, which has become popular and is in use on railroads throughout the country.

Mr. Dow has for some time been active in the National Safety Council and is chairman of the transportation section of the council. He was elected president of the New York Local Council at the time of its organization in March, 1915. The New York association was not organized until too late in the spring to get well under way before the hot weather set in, yet the executive committee is holding monthly meetings and making arrangements for active and progressive work during the fall and winter. It is the purpose of the Council to take up both industrial and

MARCUS A. DOW,
President, New York Council.

HARRY J. BELL,
President, Chicago Council.

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W. F. ROBERTS,
President, Lehigh Valley Council.

public safety and plans are being made for a number of influential and well-known public and industrial men to speak at general safety meetings. This council has a strong membership and before the end of another year it will undoubtedly be a valuable factor in safety work in the vicinity of New York.

Harry J. Bell, safety inspector of the Chicago & North Western Railway, is president of the Chicago council. In Mr. Bell's opinion, "Safety First" is not a question of dollars and cents. It is an earnest endeavor to wipe out accidents. He holds that any man who does not do everything consistently possible to help the cause of "Safety First," at every opportunity, is not performing his full duty to himself, his fellow employes or the company which pays him to do his work in a safe manner. Mr. Bell predicts that when men come to appreciate that their lives and their limbs are their most valuable assets (and the American workman, he believes, is rapidly reaching that understanding), they will of their own accord eliminate accidents. The Chicago council has endeavored to impress these facts on workmen, employers of labor, and the men who are devoting their thought and energy to the conservation of human life and limb. And because of co-operative and efficient work by its officers and members, the Chicago council feels that it has accomplished, in a measure, what it set out to do. Each month the council holds an open meeting, generally with a very good attendance. It has reached a great many people, through every available channel. How much good it has done is best indicated by the fact that the safety movement in Chicago has spread thoroughly and consistently, and companies with whose records the council is familiar, have largely reduced their accidents. That is the real result the council is striving to obtain and it hopes to be able to do much more to promote the good work.

Immediately after the formal organization of the National Safety Council in New York City in September, 1913, the Bethlehem Steel Company invited the manufacturers throughout the Lehigh valley and its vicinity to assemble at its general office building for the purpose of organizing a local safety council to promote the "Safety First" propaganda. In response to that call about 20 companies sent their representatives to South Bethlehem, and an enthusiastic organization meeting was the result. Application for a local section was made and Lehigh Valley Council No. 5 was organized.

On December 5, 1913, the first regular meeting of the local council was held, at which time W. F. Roberts, general superintendent of the Bethlehem Steel Company, who had taken the initiative in organizing the local section, was unanimously elected president. Having been actively engaged in the safety campaign carried on by his com-

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L. B. ROBERTSON,
President, Detroit Council.

E. K. PRICHETT,
President, Grand Rapids Council.

pany, Mr. Roberts was well qualified for the office to which he was elected, and at the first annual meeting of the council he was unanimously re-elected president for a second term. Under the direction of Mr. Roberts the membership of Lehigh Valley Local Council has increased steadily and at present there are more than 40 separate industrial companies in the organization. The aggregate number of men employed in these various industrial establishments is more than 60,000, so the influence of the work being done is far reaching, indeed. In an industrial district such as is found throughout the Lehigh valley the seed of safety has a fertile soil in which to take root. The indications are that the council will thrive and continue to spread the gospel of "Safety First."

L. B. Robertson, general attorney of the Ford Motor Company, is president of the Detroit local council. He has been interested in safety work for many years, especially in accident prevention and workmen's compensation. He was president for three years of the Michigan Manufacturers' Association, and chairman of its committee to conduct an investigation and formulate the workmen's compensation law. The committee gave the matter thorough study and the law it proposed was afterwards recommended, substantially as prepared, by a special commission appointed by the State. The Michigan law went into effect September 1, 1912, and has been very satisfactory. On September 1, 1912, Mr. Robertson took charge of the legal department of the Ford Motor Company and the organization of its safety department and accident prevention work, together with the handling of all compensation matters. He is a director in the National

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JOHN R. BROWNELL,
President, San Francisco Council.

F. G. BENNETT,
President, Columbus Council.

Safety Council as well as president of the Detroit local council. The local council is very active in safety matters and is co-operating with a special committee of the Board of Commerce to extend the work to public safety of all kinds in addition to industrial safety. The activities of the combined bodies have resulted in a remarkable safety awakening in Detroit. "Safety First" methods in Detroit, both in a public and a private way, compare favorably with those in any other city in the country.

The Ford Motor Company early in its existence recognized the value of special attention to accidents and has always maintained an efficient safety system. Previous to the taking effect of the Michigan Workmen's Compensation Law, September 1, 1912, it had covered its entire accident hazard by insurance, but after the passage of the law it decided to cancel its insurance and to carry its own risk. A complete system for the prevention of future accidents was planned and increased facilities for the care of accident cases were installed. A first aid hospital was equipped with all of the latest devices, including a complete X-ray outfit, for the prompt care of emergency cases. Experienced surgeons and first aid men were employed and an immediate campaign started for the minimizing of accident effects and the ultimate elimination of accidents from the Ford factory. The movement had the hearty co-operation of the active factory officials and workers. A summary is given below of the Ford Company's experience for the first two years' operation under the law:

	Sept. 1, 1912-13	Sept. 1, 1913-14	Decrease
Total reported accidents	2,366	1,085	54%
Men losing over one day's time.	536	378	29%

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Total men paid compensation ..	97	31	68%
Total accrued compensation ..	$10,695	$5,203	51%

These figures demonstrate the results of two years of united effort in the reduction of accidents and the wisdom of "Safety First" in manufacturing operations.

E. K. Prichett, secretary of the Macey Company, is president of Grand Rapids (Mich.) Council. Mr. Prichett has given considerable attention to safety work for the last four years, originally through the activities of the accident prevention committee of the National Association of Manufacturers. About two years ago, when it became recognized that men should understand the danger of machines on which they were working, a safety committee was organized in the Macey plant. During the winter of 1913 a number of films on accident prevention furnished by National Association of Manufacturers, were shown at the social centers for the benefit of the Macey company employes. In the spring of 1914 a meeting was held in Grand Rapids for the purpose of considering accident prevention, and the organization of the Grand Rapids Safety Council followed, Mr. Prichett being elected to the presidency. From that time up to the present, the membership of the council has been constantly increasing and the roll now includes more than 50 names. Frequent round table meetings have been held and addresses made by leaders in the accident prevention movement. The Grand Rapids council is considering plans for next winter and it is expected that general accident prevention work will be under strong headway in that city in 1916. S. L. Vaughan, traffic manager of the Grand Rapids, Grand Haven & Muskegon Railway, is vice-president of the council; E. A. Meaves, assistant manager of the Excelsior Wrapper Company, is secretary and treasurer.

John R. Brownell, superintendent of safety of the Industrial Accident Commission of California, is president *ad interim*, of the San Francisco council. Prior to assuming his duties with the Industrial Commission, Mr. Brownell had charge of the safety department of the Pennsylvania Steel Company at Steelton, Pa., for a period of three years. The San Francisco council holds fortnightly luncheons which have been extremely successful. On these occasions, the council is addressed by men prominent in the different lines of accident prevention. At other times round tables have been the features of meetings. The San Francisco council is looking forward to a large increase in membership during the next few months. On the Pacific Coast an increasingly favorable attitude of co-operation is being developed. This is especially noticeable in the response by employers who were at first decidedly opposed to the safety act, under which the Industrial Accident Commission is operating. They have changed their attitude of antagonism to

G. L. AVERY,
President, Peoria Council.

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DR. FRANCIS D. PATTERSON,
President, Philadelphia Council.

one of co-operation and assistance in carrying out of the suggestions made to them under the requirements of the act.

F. G. Bennett, president of the Columbus (Ohio) local council, is the safety director of the Buckeye Steel Castings Company of Columbus, which position he has held for the last eight years. The company has followed the general lines of the safety movement and is a member of the National Safety Council. "We have had excellent results with safety work in our community," Mr. Bennett remarks, "and I feel safe in saying that the National Safety Council is here to stay. Also I wish to comment on the excellent service SAFETY ENGINEERING is rendering to the cause of the prevention of accidents. I consider the 'Magazine of Safety' one of the most essential features of our safety propaganda at this plant. Other publications, issued by the Workman's Compensation Service Bureau, have filled a long felt need and are of excellent service to us in establishing some semblance toward standard safety devices. I consider the 'Universal Safety Standards' on foundries and machine shops to be so complete and practical that they could easily be adopted by any State in the Union as factory regulations."

G. L. Avery, president of the Peoria Council, is secretary of the Avery Company, Peoria, which has done notable work in industrial accident prevention. The Peoria Council has enlisted the support and co-operation of the Association of Commerce, and Mr. Avery has consented to serve as chairman of the Public Safety Committee of the Association. Thus the work of the two organizations is harmonized and co-ordinated. The mayor of the city, the chief of the police, the sheriff, the commissioners of public works, highways, waterway, and harbor, the superintendent of schools, the transportation companies and other public utilities, many manufacturing and contracting companies and managers of places of amusement are co-operating also to advance the safety movement. Early in September, H. L. Brownell, safety inspector of the Chicago Surface Lines Company, delivered open air lectures in Peoria, addressing large groups at two meetings on successive evenings. Another lecture by Mr. Brownell is planned, for the benefit of the school children, and the street car company has agreed to transport the children from the schools to the Coliseum and back again. One of the Peoria theaters is displaying safety bulletins on a bulletin board in front of its box office.

Francis D. Patterson, M. D., president of the Philadelphia Council, has charge of the departments of sanitation and accident prevention of three large Philadelphia industrial establishments, namely, Harrison Brothers & Company, Inc., the J. G. Brill Company and the Electric Storage Battery Company. His duties with the corporation first named, began four years ago, with the other corporations, two years ago. The Philadelphia Council is an active body and is doing good work in the safety field. Reports of its interesting meetings have appeared in various recent numbers of SAFETY ENGINEERING.

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SPONTANEOUS COMBUSTION EVERY DAY

DEMONSTRATIONS of spontaneous combustion were made recently by the safety department of the National Cash Register Company, Dayton, Ohio, for the education of employes, partly as a result of a fire on the night of August 27 in the finishing department. The fire started in a bin where oily rags had been carelessly thrown. On one rag, it is believed, there was a little linseed oil. Drying of this oil, under certain conditions will start a fire.

In order to impress upon the minds of the employes the danger of allowing waste paper of any kind to accumulate, it was decided to demonstrate just how fire may be started without the application of a match or spark of any kind.

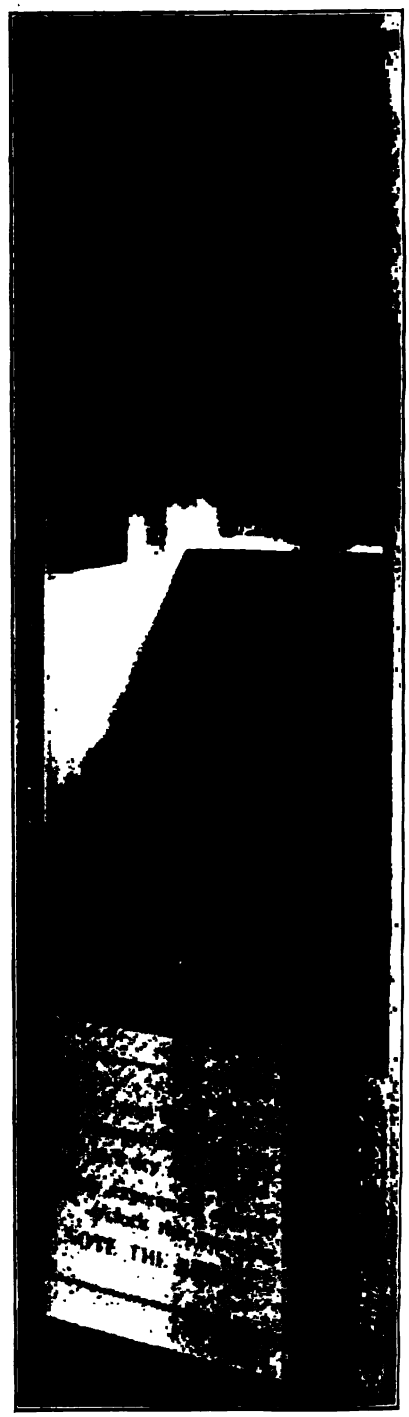
A large tin box, from which one side had been removed, was placed in the hall window of the safety office. In this each morning are placed three rags, saturated with linseed oil and loosely confined in a dry rag to hold the heat. A few hours later the rags become a smoldering mass, ready to burst into flames. The explanation is that linseed oil is fast-drying. When finely divided on a cotton cloth, a large surface of the oil is exposed to the air. Large quantities of oxygen are absorbed and heat is produced. The outside cloth conserves this heat. Finally, the temperature becomes so high that the cloth burns. Hundreds of fires in various parts of the country start from such causes.

Soot, linen, paper, cotton or woolen stuffs, when soaked with relatively small amounts of oils and exposed to limited access of air, take fire. Members of the National Cash Register health and safety committee recently investigated a fire discovered in a floor mop. The mop had been used to polish floors and was soaked in a fast-drying oil. Spontaneous combustion resulted.

On another occasion at the National Cash Register plant a fire was discovered in a charcoal bin. Charcoal dust, when slightly moistened, absorbs oxygen so rapidly that it burns. Steel and iron dust act in a similar way.

The only safe rule to follow, the safety committee points out, is to keep all workshops scrupulously clean, and to refuse to allow rubbish or waste materials to accumulate.

Every day should be a Clean-Up-Day and a Fire Prevention Day in every manufacturing plant in the United States.



Spontaneous Combustion to Order

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ELEMENTS OF SAFEGUARDING

THE IRON FOUNDRY—PART II.

By F. W. Bail

A FOUNDRY management which is willing to make the necessary initial expenditures to furnish well designed buildings and safe equipment would not begrudge an additional cost, were such a cost involved, of obtaining a sound and sober personnel well trained in safe practices, should such a management only realize the importance of this feature in safeguarding the foundry. Many pioneers in the safety movement have shown their appreciation of this feature by devoting much time and effort to welfare and educational work, but a surprising number of employers who have lately become interested in the safety movement have, after placing their shops and mechanical equipment in safe condition, been prone to lean back in their chairs and say, "We have done our part, now let us see if the workmen appreciate it;" and like the baseball pitchers, who "let down" after securing a "lead," they often lose out.

THE BLIGHT UPON FOUNDRY SAFETY

This, and the fact that a policy of "pushing" the superintendent is sometimes substituted for scientific management explains why numerous shops of modern design, equipped with machinery which is quite well guarded still possess "drivers" for foremen, and workmen of the unreliable and irritable types who "rush the can" at every opportunity and make the existence of sober and conscientious workmen almost unbearable. Safety cannot take root in such soil and, under such conditions, the enthusiasm of the employer for securing safety is apt to wane until he becomes pessimistic and reaches the conclusion, "It can't be done."

Such working conditions have contributed more than any thing else toward making the excessive use of intoxicants an inheritance of foundry workmen, and the fault lies not with the workmen as a class but with the employer who complacently permits vile working conditions, excusing them as traditional and, therefore, fails to establish wholesome conditions.

PREPARATION FOR SAFETY

No foundry presents a hopeless problem. It matters not how unfortunate the location may be, conditions may be remedied if the management takes an active interest in the welfare of its workmen. Taking for granted, due to the experience of many large corporations, that workmen's welfare organizations cannot succeed without the elimination of "booze," it behooves the progressive management to see that workmen are provided with proper lunching places. Many plants now furnish lunch rooms where the workmen may bring their own lunch or buy food from the company at just enough above cost to make the lunch room self-supporting. One case has come to the writer's attention where three "free lunch" saloons chiefly dependent upon noon-hour trade from a large plant across the street were forced out of business within fourteen months after the establishment of a company lunch room by the competition of coffee and milk against "booze." After a force of sober workmen has been obtained, safety and welfare, which have so many properties in common, may be developed at a speed which will astonish even the most dubious, and the founder at his ancient trade will prove to be a mighty fine fellow after all.

The next step in the establishment of foundry safety is that of training the workmen in safe practices and cautioning against unsafe practices. The positive instruction is by far the most effective and the negative should only be resorted to when a workman is loathe to abandon some pet dangerous practice. The foremen should assume the attitude of instructors, and when this is done a spirit of frankness will soon prevail instead of the old spirit of deception which established a "Cemetery of Lost Castings" in

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more than one foundry yard. With this spirit firmly established, the workmen will heed advice on safety where formerly they only endured it.

THE SOURCE OF MOST ACCIDENTS

The first efforts of instruction may well be directed toward the prevention of burns due to sparks and splashes of molten metal. The records of the Industrial Commission of Wisconsin throw much light on this subject. In 1913, 311 accidents were reported in which men were disabled for more than seven days owing to serious burns from molten metal; 62, or 20 per cent, occurred while metal was being poured into molds; 53, or 17 per cent, while metal was being carried in hand ladles; 32, or 11 per cent, because of stumbling in obstructed passageways. Metal explosions caused 19 accidents, 18 were caused by metal running out of molds and in 12 cases the accidents were due to defective ladles or lining. The remaining accidents were due to various other causes: men carrying ladles bumped into each other; on tapping the cupola the sparks of metal burned men standing near by; ladles and crucibles fell from crane hooks and tongs; ladle trucks jumped the track and tipped over, etc.

The members of the body, most liable to injury from molten metal, are indicated by the following data taken from the same report: In 70 per cent of these accidents the injured workmen had one or both feet seriously burned; 43 cases resulted in eye injuries, 19 in burns on the legs and 26 on other parts of the body.

PROPER DRESS—BEST SAFEGUARD

The foregoing figures signify that suitable dressing by all men handling molten metal, especially in regard to pants and footwear, is the most effective method in guarding against burns. Hard cloth (jean) pants and congress or gaiter shoes have proven most desirable. Congress shoes of chrome tanned leather snugly fitted and equipped with a strong elastic gore will usually shed molten metal but in case some should enter, they can be quickly removed. Canvas leggings have also been used effectively in the prevention of burns. Numerous foundries supply suitable pants, shoes and leggings to the workmen at cost and the types mentioned are increasing in favor with foundry workmen especially because of the low cost. The wearing of lace, button, or low cut shoes by anyone on the foundry floor should be absolutely prohibited.

With the feet and legs properly protected, the eyes are the members most susceptible to injury. The eye accidents can be practically eliminated but only by the use of suitable goggles. The glass should be clear in quality, tough in texture, and be made only in plane surfaces because convexity is very injurious unless made to parallel the eye itself and this is impossible in inexpensive types of goggles. While the goggles should completely protect the eyes from flying sparks or chips, care should be taken to provide ample ventilation and thus prevent clouding due to insensible perspiration of the eyes, cheeks, and forehead. Clouding due to changes in the temperature and humidity of the atmosphere may be easily prevented by use of "anti-sweat" pencil, which when rubbed on the glass will keep it from clouding for six or eight hours. The goggles should be so designed that they may be easily adjusted and slipped up on the forehead with one motion of the hand. Lateral vision should be provided in order that the workman can perceive objects coming from the side.

CORRECT PRACTICES

The cupola furnace is by far more commonly used than the reverberatory or air furnace and it presents infinitely more dangers to workmen. Care should be taken to lock the charging door before entering to repair the lining. It is also good practice to suspend a catch pan or substantial wire mesh frame somewhat above the level of the wind belt before attempting to remove parts of the lining for bricks may be jarred loose, causing serious injuries. If scrap is charged, it should be broken up and carefully inspected, for water sealed in scrap has caused cupola explosions that rivalled boiler explosions in severity.

The cupola tender occupies one of the

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Proper Method for Carrying Hand Ladles

most perilous positions in the foundry, for there are scores of ways in which severe burns may be obtained while tapping. A coating of at least an inch of loose dry sand should be spread over the floor in front of and under the cupola before the heat is completed to prevent iron or slag from spattering. Several extra well pointed and heated tapping and chisel bars should be at hand before any attempt is made to remove the stopping bod. The bar should be worked around the outer edge of the stopping bod until it is loosened sufficiently to cause the pressure of the metal to force it out. Excess iron should be drawn off into "turn over" pig molds elevated sufficiently to avoid stepping into them. Bod material for stopping should have about the same amount of moisture as well tempered molding sand. A wet bod will cause an explosion the instant it touches the stream. A wooden bod stick with an iron tip is more easy to handle than one of solid iron, and much safer than an all wood stick, for the stopping bod is quite liable to slip and if the bare end of the wooden stick is thrust into the stream, it will shower the metal in all directions. The bod should not be slid up the spout, but should be held above the stream and thrust in obliquely.

The placing of a pit in front of the spout to receive a reservoir ladle should be avoided if possible but where this has been done, exceeding care must be used by workmen to avoid slipping or stumbling into the ladle, and the pit should be kept perfectly dry to avoid a serious explosion in case the metal should overflow. If possible all hand ladles should be lined by one man to avoid tendency of molders to line lightly, and they should be thoroughly dried in ovens.

New men should not be permitted to carry molten metal for at least a week, for they should be thoroughly familiar with the shop practices and the layout of the floor. Periodical ladle drills, especially where a heavy line of work is handled, are very effective in assisting molders to run off a heat with dispatch and without confusion. All molders should be instructed to cut the stream

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from the front and not from the back. The hand ladle should be carried with the knuckles of the upper hand turned forward and the bowl held well behind. (See illustrations.) When necessary for men to pass each other with hand ladles it is a good practice to pass on the bowl side as this lessens the danger of collisions. Pourers should keep their feet well away from the mold to prevent burns in case of a runout. Care should be taken that iron is not poured into damp or rusted chillmolds or wet sand molds, as an explosion is sure to occur. Bull ladles should be carried by men of about the same height and where molds are high, portable horses which straddle the molds may be effectively used to facilitate pouring.

Scrap, when placed in ladles to chill the iron, is liable to cause serious explosions if it happens to be wet or rusted. It should at least be slightly heated before being placed in the ladle. Skimmers should be heated to a cherry red before being used, for if thrust into the metal while cold, they will give a veritable shower bath of molten metal to all workmen in the immediate vicinity. Workmen should be cautioned against dumping waste metal in the gangways, as it quickly blackens by oxidation and has caused nasty foot burns when workmen unsuspectingly stepped into it. No fooling with molten metal such as heating buckets of water with it for washing should be permitted for terrific explosions have occurred when such buckets contained iron rust or a little clay wash.

Practically all the accidents of the cleaning room are eye accidents. There is little excuse why these cannot be entirely eliminated by use of burlap chip screens and goggles. Even with the sanitary features of the cleaning room or chamber provided for as previously described, it is well for workmen who are subject to any form of lung trouble to avoid them.

The combination of well designed buildings, safe mechanical equipment, and a personnel of sober and well instructed workmen is the only combination that will lift a plant to a high plane of safety. The prospect of the iron founding industry reaching such a plane is exceedingly hopeful, for it is blessed by a Safety and Sanitation Committee supported by its National Association which has proven to be one of the most efficient and progressive safety organizations in the country.

LIGHTING A TIME FUSE

The following method of lighting a single black powder time fuse is suggested by the United States Bureau of Mines as being more efficient than the old method of splitting the end of the fuse. The method is adapted to use when only one piece is to be lighted it is not applicable when several pieces are to be lighted, as the time interval between ignitions would be too long.

A safety match is held against the powder core at the end of the fuse and the match-box drawn across the match causing the match and powder core to inflame immediately. It will be noted that this is just the reverse of the usual way of lighting a match—drawing the match across the box.

In case safety matches are not at hand, the ordinary household match can be used by placing one match against the powder core and then lighting another and quickly touching it to the first one.

It is believed that the method outlined, which originated with W. C. Cope of the explosives chemical laboratory of the bureau in Pittsburgh, as the result of experience obtained in the igniting of hundreds of pieces of black powder fuse, will be helpful in quarrying and other outside work. It has the advantage of cheapness, as no fuse lighters are required.

The enforcement of workmen's compensation laws has been a potent and impelling factor in the "Safety First" movement.—*Richard Hoag.*

In safety work sight should not be lost of the fact that for approximately two-thirds of every working day a workman is his own boss, so that during a greater portion of his time he can by his methods of living, render himself either fit or unfit to perform the day's work. It is therefore obvious that safety work must be extended into the home, but it is not so obvious as to how this may best be done.—*C. B. Auel.*

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ILLUMINATION AND ONE YEAR'S ACCIDENTS

Address by R. E. Simpson Before the Illuminating Engineers' Society.

THERE is a widespread belief prevalent today that there are approximately 500,000 avoidable accidents per year in this country, and that about one-quarter of this number are caused directly or indirectly by improper lighting facilities. So far as can be learned these figures are estimates made by persons who have had considerable experience in accident-prevention work. There is little evidence to show that any systematic effort has been made to point out the relation between light and accident rate. This is due to the want of statistical data, owing to the enormous labor and expense involved in obtaining such data. A number of men interested in good lighting or in accident prevention, or both, have pointed out the many ways in which the lighting of a factory may influence the accident rate. In some instances studies were made of certain industries, notably by Mr. D. R. Wilson, special inspector in the Factory Inspection Service in Great Britain, who in 1911 and 1912 investigated the lighting conditions in British textile industries and in foundries. In neither one of his reports are there data to enable one to ascertain the percentage of accidents due to the inadequate lighting conditions described.

At about the same time, Mr. John Calder presented a paper before the American Society of Mechanical Engineers, showing the increase in the number of fatal accidents during that part of the year when the ordinary factory working hours, 7 a. m. to 6 p. m., extend beyond the daylight period. The curves presented with his paper showed conclusively that the number of accidents in December and January was 40 per cent greater than the normal number that might reasonably have been expected if there were the same number of daylight hours in the winter as in the summer.

The records of workmen's compensation and accident insurance companies offer a fruitful field for the study of accidents, provided particular attention is given to details in the investigations. In this respect a few notes on the lighting arrangement will often explain the cause of an accident. The Travelers Insurance Company is particularly fortunate in having over 200 men who are specialists in accident-prevention work. A record is kept of every accident in and about factories, shops and mills carrying insurance with the Travelers, and all important ones are investigated by the inspectors, who ascertain the conditions that prevailed at the time of the accidents. The reports of these men form an authoritative library on causation and prevention of industrial accidents, and among the causes, and the recommendations for the prevention of future accidents, the lighting question plays an important part.

The main object of this paper is to present the results of a study of these reports covering a period of one year from January 1 to December 31, 1910. All accidents incident to the use of automobiles, teams, bicycles, trolley cars, and slippery pavements are omitted, as well as all accidents occurring in and about coal mines. While there is absolutely no doubt that the darkness of a coal mine, broken only by the feeble light from the miner's lamp, is largely responsible for many coal-mine accidents, there are so many other factors bearing on the subject that reliable conclusions cannot be drawn. It is worthy of note, however, that the introduction of electricity for haulage purposes has provided the coal operators with a ready means of lighting the more important switching points in the mines. The use of steel and concrete for roof support, and the application of whitewash to the roof and sides at the turnouts, switching points, and shaft bottoms, materially increases the illumination. Good lighting is essential here in order that the motorman may see that the switches are properly set, and that no standing cars block his way, thus enabling him to avoid derailments and collisions. The other employees at these, the busiest

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parts of the mine, can also perform their duties much more efficiently and safely because of the better illumination.

Excluding these classes of accidents, there still remain more than 91,000 accidents which occurred in and about industrial plants; and of this number 23.8 per cent were due, directly or indirectly, to the lack of proper illumination. This figure, 23.8 per cent corresponds very closely to the estimate of 25 per cent already mentioned. There is this difference, however, in that the estimate of 25 per cent was based on avoidable accidents, while the 23.8 per cent obtained from the Travelers Insurance Company's records embraces both avoidable and unavoidable accidents. It is evident from the records that a large number of the accidents were unavoidable, particularly in those instances where the lighting condition was a contributory rather than a direct cause.

A further analysis of the records shows that 10 per cent of the total industrial accidents for the year were due primarily to inadequate illumination, and in the remaining 13.8 per cent the lack of proper lighting facilities was a contributory cause. It is probable that another person in going over these records would arrive at different percentages of direct and indirect causes of accidents due to the illumination, but this would simply represent a difference of opinion in those cases where equally good arguments might be put forth in favor of one view or the other. The essential feature of the analysis is the large percentage of accidents in which the illumination had an important influence.

Under the heading "direct cause" were included all accidents on stairways, in passageways, or in the shop where it was shown that there was no light in the immediate vicinity. It is true that many persons have been injured by falling down stairways that were well lighted, and, therefore, the illumination could have had no bearing on the accident. It is likewise true that if none of the stairways in the country were provided with light, the accident rate from this cause would be vastly increased.

It may be interesting to cite a few typical cases where insufficient or improper illumination was a cause of an accident. In a certain shop having widely spaced lighting units a supporting column cast a shadow which hid a flat 2-inch bar lying at an angle across the passageway on the floor. When one of the front wheels of a truck encountered the bar, the truck axle, swerving sharply to the right, jerked the handle out of the laborer's hand and struck the right foot of a workman standing at the side to let the truck pass. The blow broke one of the small bones in his foot. The sudden stopping of the truck also caused one of the heavy pipes on it to roll off, and the truck handle, acting as a skid, guided the pipe against the workman's left leg, breaking both bones below the knee. It is evident that neither man saw the bar of iron on the floor, a fact which is easily understood when one considers that the floor and the bar were both dark-colored, and further obliterated by the shadow. It is fair to assume that had adequate light been provided, one of the workmen would have seen the bar, and would have removed it instead of attempting to pull a heavy truck over it.

A paper-mill employe, while feeding a conveyor with short pieces of pulp wood, noticed that the chute at the other end of the conveyor had become clogged. There was no light at the chute, nevertheless the man after stopping the conveyor attempted to clear the way, and while thus engaged a block of wood slipped out and broke his ankle. There was no occasion for any of the workmen using this part of the mill unless the conveyor or the material caused trouble. This, however, was just the time light was needed and none was provided. The amount of money required to maintain a unit affording ample illumination at this point is negligible when compared with the amount of the claim paid the injured workmen; in fact, such a unit could have been kept burning all day, and every day for a hundred years, and still the owner would have realized a handsome profit; and one employe, at least, would have been saved from injury.

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The following two instances represent conditions often seen in certain industries. In the first one, a man fell into a tank containing hot water and acid, and was fatally burned. A number of tanks were placed close together, with narrow walks between them at the top. There were no guard-rails along these walks, and no artificial light was provided, even though the presence of workmen at this point was necessary at odd times of the day. The accident happened just before quitting time in the latter part of December. In the other instance the natural light was not adequate and was supplemented by incandescent lamps. Both the lamps and the windows had a thick coating of grease and dirt, so that by no stretch of the imagination could the illumination be called other than very bad. Nor were there any guard-rails along the walk at the top of the vats containing scalding water. It is not to be wondered at that a workman made a misstep and was scalded to death.

In another case lack of light in the hold of a vessel was, without doubt, responsible for a crushed foot. A workman was piling pig iron there, in semi-darkness, the open hatch, far above, admitting so little light that he could not see that the pile was uneven. While he was still at work the pile toppled over and injured him, as stated. Under exactly similar conditions another workman could not see that a hook was insecurely caught in a bale of cotton that was to be hoisted from the hold of a steamer, and when the hook slipped the falling bale struck the man a glancing blow, breaking his collar bone. In this instance the difference of a few inches in the man's position was all the margin there was between injury and death. In the punch-press room of a certain factory an overhead skylight provided plenty of illumination on bright days, but in the winter months, and especially on gray, cloudy days, the daylight illumination was so much reduced as to occasion repeated requests for auxiliary artificial light; and an injured workman based his claim for damages on the ground that the employer had failed to provide sufficient illumination.

Two steam-fitters, having finished some work on a temporary platform 9 feet above the floor, instructed a laborer to remove all supplies and tools. The steam-fitters had used an extension cord drop-light which they took away with them, thus compelling the laborer to depend on the reflected light from the units below him. He failed to see a short piece of steam pipe, which soon afterward fell on a workman below, fracturing his skull. This is the type of accident generally classed under the item of "struck by falling material." It is probable that if sufficient illumination had been provided, the laborer would have seen the pipe and taken it away with the other material, thereby preventing the accident; and under the circumstances it is certainly fair to state that the lack of illumination was a contributory cause.

Two trucks being pushed in opposite directions collided on an overhead bridge, and both truckmen were injured by material falling from the trucks. The noise in adjoining shops, in addition to that caused by the trucks themselves, prevented each truckman from hearing the approach of the other. The covered bridge had side windows, but no other means of providing light, and as the accident occurred late in the afternoon in January, the lack of light plus the noise were responsible.

A machine with four saws on one shaft was well guarded, but the drop-light had been so arranged by the operator that one of the guards cast a deceiving shadow. The man thought he was placing his hand on the guard, but instead he placed it on the shadow and was badly injured. This was purely a case of improper lighting, and it points out the hazard in the practise of permitting a workman to adjust the lighting units to suit his own convenience, instead of having them placed by a lighting expert who has studied the safety problem carefully.

A workman using an extension-cord light found it necessary to use both hands, and he, therefore, made a loop of the cord and hung it about his neck. The worn-out insulation of the lamp cord allowed sufficient arcing to set fire to the

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man's celluloid collar, causing extremely painful burns about the neck and head. In this, as in most other accidents, a great many "ifs" might be thought of; but none of them can hide the fact that there were no permanent means of lighting the section of the shop in which this particular accident occurred.

Finally, there may be mentioned the correlation between a workman's broken wrist and the rather prosaic escape of two hogs from a pen. No doubt all would have gone well had not one of the hogs elected to sleep on the path between two buildings in a plant. True to his name and nature, the hog obstructed the whole width of the path, causing the workman to stumble over him. There was no means provided to light his pathway, even though it was the direct route between the buildings and as such was in constant use.

There were several cases where inadequate illumination had impaired workmen's vision, so that these men were subsequently injured while working under lighting conditions that were excellent for normal vision. Their claim that their injuries were due to insufficient lighting was hardly justifiable when applied to the last working place, but it is certain that the impairment of their eyesight due to the poor lighting at their previous work-place had an important bearing on the case.

At the beginning of this investigation an attempt was made to classify the accidents due to the lighting conditions in greater detail than "direct" and "indirect," but this soon proved to be impracticable. If the same proportion had prevailed throughout the records as was evidenced in the first 5,000 cases investigated, the lighting accidents on stairways, passageways and other

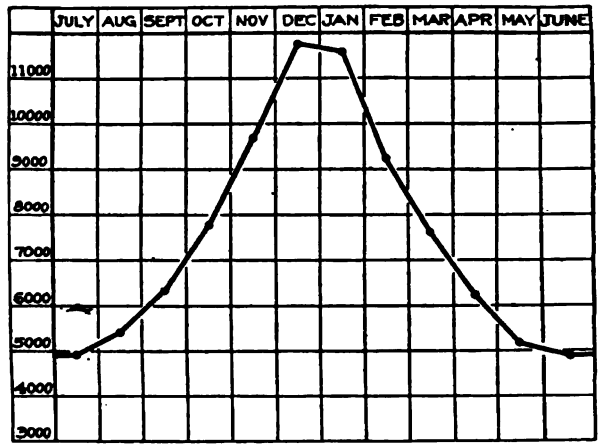

Fig. 1. Showing the seasonal distribution of all industrial accidents for the year.

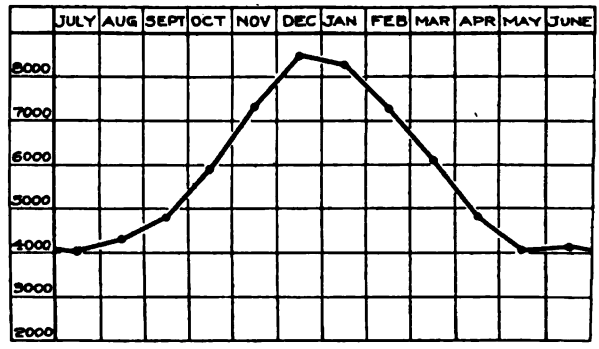

Fig. 2. Showing the seasonal distribution of all industrial accidents caused by inadequate illumination.

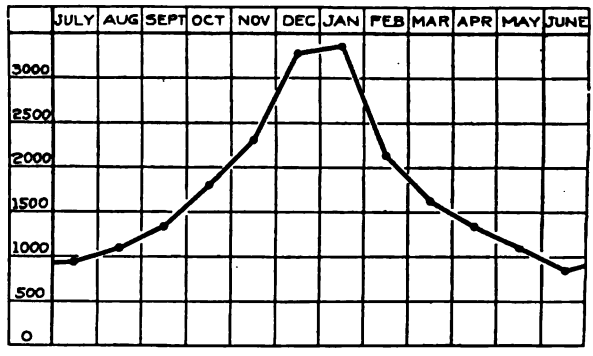

Fig. 3. Showing the seasonal distribution of all industrial accidents exclusive of those due to inadequate illumination.

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seldom-used parts of shops would have had by far the highest rank. It is very generally recognized by illuminating engineers that these are just the places that are likely to be slighted in the original installation, or the maintenance, of factories equipped and operated by the rule-of-thumb method. If one compares the number of accidents that occur at these points, bearing in mind the relatively short time that they are used by a few men, with the number of accidents occurring in the better lighted shops, again having in mind the large number of men and the greater length of time they are subject to the hazards, it is found the accident rate, in the first-mentioned places is abnormally high. It is impossible to draw any other conclusion than that the lack of illumination is largely responsible.

Fig. 1 shows in a diagrammatic form the monthly distribution of all the industrial accidents reported for the year, and Fig. 2 shows a similar distribution of all the accidents caused by inadequate illumination. There is a striking similarity between these curves and those published by Mr. Calder and other investigators. From Fig. 2 the fact may be deduced that 51.6 per cent. of the accidents due to poor illumination occurred in the months of November, December, January and February, while 48.4 per cent. occurred in the remaining eight months. This indicates that the likelihood of an accident being caused by poor lighting is more than twice as great in any one of these four months as in any one of the remaining eight months.

Fig. 3 shows the seasonal distribution of accidents exclusive of those in which the lighting conditions had an influence. It will be noted that the increase in the accident rate in the months of November, December, January and February is not so pronounced as in Figs. 1 and 2. If the lighting condition was the only factor contributing to the increase in accidents in the winter months, the curve in Fig. 3 would be practically straight. The similarity of the three curves raises the question as to whether or not a greater number of accidents than those shown were due to the lighting conditions. It is probable that the lack of information in some of the reports is responsible for a certain number of accidents attributed to the lighting conditions being overlooked, but just what this number would be is purely conjectural.

There is another factor which will help to explain the increase in the accident rate in winter months, and in this the lighting conditions play an important part, though it is impossible to obtain any reliable figures. It is partly psychological and partly physiological, but may be better understood by referring to it as the depressing effect of cold dreary weather on mankind. It is a well known fact that the members of an exploration party to the Arctic region are carefully selected not only for their scientific attainments, but also for their physical and temperamental fitness to withstand the rigors of the weather and the strain of the long hours of darkness. Notwithstanding this careful selection, the history of almost every Arctic expedition records the failure of some of the men under conditions which would have been easily surmounted if they had prevailed at the beginning of the expedition. The intense cold and the cheerless outlook brought about by the lack of comforts craved by the human body, coupled with the long stretches of darkness, render the men unfit for their work.

We do not have such extremes of coldness and darkness, nor such lack of associations or bodily comfort, in our industries. On the other hand, our workmen are not selected to bear up under such conditions. Everyone is aware of the depressing effect of a week of overcast skies with a more or less steady rain-fall. Substituting cold weather and snow for rain, one can picture the conditions that prevail in the winter months. Colds and other ailments are more prevalent in winter, and the afflicted workmen are less able to guard against injury. Then again there are many buildings where the window area and arrangement affords inadequate illumination on cloudy day, even when it is satisfactory on bright days. This is a condition that is likely to be overlooked by the inspector if he makes an inspection on a bright day. It is quite evident that a large number of accidents might occur under

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these conditions, and little, if any, thought be given to the underlying cause.

It is hoped at a later date to make a study of the accidents for the year 1915, in order to ascertain what influence, if any, the educational campaign of the Illuminating Engineering Society, the lamp manufacturers, the insurance companies that have studied this matter, and others interested in good lighting, has had on the reduction of accidents. An examination of a few of this year's reports indicates the trend of the times in that five years ago general expressions such as "no light" or "insufficient light" were commonly used in describing the cause of an accident, whereas at the present time we meet with much more definite statements, such as "improperly placed lighting units" or "low-hanging, unshaded lamps." From this one may gather the cheering information that the workmen are gradually appreciating the vast difference between light and illumination. It might be expected that fanciful claims will be made, such as that put forth by an injured workman to the effect that the actinic rays of the lighting unit impaired his vision. The lighting unit in question was a 16-candlepower carbon lamp equipped with a bowl-shaped aluminum-finish reflector.

A statement has been made to the effect that the introduction of the high efficiency lighting units was the largest single factor for the increase of accidents in our industries during the period of artificial lighting. This statement is not to be taken as a condemnation of these lighting units, but rather as a protest against the common method of using them. There are hundreds of small manufacturing establishments in this country, each one occupying a single floor or part of one floor in a building. The owners have had the floor wired and connected for central-station service or piped for gas service. They have procured incandescent lamps, gas tips, or mantles, as the case might be, and used them without proper accessories. Of diffusing glass, reflector equipment, mounting height, and other fundamentals of good lighting they either know nothing or care nothing. The workmen adjust the units so that they can "see," the adjustment generally consisting in placing the lighting unit close to the work, very often between the man and the work, and almost always in the direct line of vision. The carbon lamp or the open-flame gas light contributed a distinct hazard under these conditions, and the hazard was greatly increased when the high-efficiency incandescent gas mantle and electric lamp were substituted without any other change being made at the same time.

In some cases the meterman is the only public utility representative to visit these small manufacturing concerns, and very little advice on the lighting conditions is given by these men. The consulting engineer or lighting expert is seldom, if ever, called in to give advice on installations where the total connected lighting load is in the neighborhood of one kilowatt. In the larger manufacturing plants the lighting bill will bear about the same proportional relation to overhead expense as it does in the small shop, although the bill itself will be many times larger. Economy has generally influenced the management in securing expert advice on the lighting question with a noticeable improvement in the illumination. This in a measure accounts for the modern lighting equipment in the large plants and also shows why they compare so favorably with the small establishments. A workman may be just as seriously injured in a small shop as in a large one; in fact, the accident rate due to the lighting conditions is likely to be higher in the small shop than in the large shop doing the same class of work. The accident insurance companies are assuming risks in the small shops as well as the large ones, and once a policy is written the premises must be inspected periodically. It is the duty of the inspector to prevent accidents by recommending changes in conditions which tend to cause injuries to workmen. Since inadequate and improper illmination is recognized as a cause of accidents the insurance company inspector tries to improve the lighting conditions, and in this capacity he is probably the most potent factor for improving the illumination in the small shops.

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In the past year the gas-filled tungsten lamp has become an established commercial product in a constantly increasing range of sizes for multiple circuits. The concentrated filament of this lamp, more nearly approaching a point source, coupled with its higher intrinsic brilliancy as compared with other tungsten lamps, makes the use of reflectors absolutely essential. The manufacturers are earnestly insistent that users equip these lamps with proper reflectors, but unfortunately this advice is not always followed. In some instances shallow dome-type reflectors were used with the vacuum-type tungsten lamp, but when the gas-filled lamps were substituted no change was made with respect to the reflector equipment or mounting height, even though the light sources were within the range of vision. Excellent results in the way of diffusion and distribution can be and have been obtained by the use of the dome-type reflector with the gas-filled tungsten lamp, but when viewed from the safety standpoint they should never be used together, unless the mounting height is such as to preclude any possibility of the lighting source being within the range of vision. Unless this principle is followed it is inevitable that the eyesight of the workmen will be impaired, and with impairment of a workman's eyesight comes a greater likelihood of injury.

FLYWHEEL EXPLOSIONS

For the benefit of those who are in doubt as to the destructive possibilities of a flywheel explosion SAFETY ENGINEERING publishes on the front cover of this number a view of an engine room that was completely wrecked by an accident of this kind.

It appears that the direct cause of this catastrophe was the breaking of the driving belt, thereby suddenly relieving the engine of the entire load. Apparently the governor did not take care of the engine, owing probably to the slipping of the governor belt, which is the most common cause of a racing engine.

Under certain conditions all engines are liable to race, regardless of make or size. Engineers are often under the impression that because the speed of their engine is low it is immune from such an accident. This, however, is an error, for it will be found that the peripheral speed of flywheels is very nearly the same for all steam engines; the slow speed type being equipped with proportionately larger and heavier wheels.

Many reasons and explanations for racing engines have been offered. It seems, however, that the most common causes are loose governor pulleys, breaking of governor belts and cohesion of sliding parts on wheel governors. From statistics compiled by various causualty companies in different parts of the country, it would appear that flywheel explosions are about 33 per cent more frequent than boiler explosions in proportion to the number of each in use. It must also be borne in mind that there are thousands of instances where an engine began to race and the engineer was sufficiently near the throttle to shut off the steam and thereby prevent what might otherwise have resulted in a serious accident.

Flywheel explosions are often accompanied by loss of life and injury to employes. This is not necessarily restricted to the engine room force, for men working on different floors which may be in line with the flywheel are all subjected to this hazard.

The damages involved may range anywhere from $500 to $100,000. In addition to this there is the loss due to non-production. There is no way of even approximately estimating this, however. The loss of profits pending the repairing of the engine and plant must be considerable in many cases.

LOOKS QUEER, BY GEE!

Says Old Man Safety, says he to me,
It seems mighty queer, it does, by gee,
Fer to see a feller with his hand tied up,
His nose all squashed, and his ears in a muff,
It sure looks to me as if he ain't done his work very carefully.

—Youngstown Sheet and Tube Company.

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THE PERSONAL TOUCH IN SAFETY WORK

By W. P. Strickland, General Inspector, New York & Queens Electric Light & Power Company

ALL theories as to the method of teaching how to prevent accidents and educating the employe with a view to promoting the welfare of the employer as well as the employe, have value. Many persons have read largely along these lines and given their theories in valuable articles full of suggestions, while others have given their practical experiences. The latter are sterling, whether they are clothed in eloquence or in plain attire. But still we find a continued reaching out for something new, something dependable upon which we can work with a surety of result and recommend as a basis for other employers. It has become apparent that mere devices for protection are inadequate and that teaching which confines the subject to first-aid to the injured and the Prone method of resuscitation, although essential, are not sufficient. Something more is needed to raise the standard, something that is not forgotten as soon as heard but is carried away as a live and sentient thing. It is not in my experience that anything new is required so much as something real. This means a departure from the perfunctory to the personal touch. Everything is now conducted on such a gigantic scale that the personal touch has been lost sight of, but, if any real progress is to be made, the workingmen must first be recognized as individuals and heard with patience and sympathy. But if the employer is going to be interested, I must not continue on this line until I appeal to him from the practical, from the commercial side, else he will say, without stopping to think, "This is a 'slop-over.'" The employer has done a great deal, but he wants better results co-operatively. He is not satisfied, consequently, something is lacking. The employer needs education as well as the employe. Co-operation means harmony in every sense of the word. It does not mean just material benefits supplied. Speak to an employer on this subject and nine out of ten times, he will cite some case where an employe has proven ungrateful for benefits received. But, what does he really know about the case? Nothing. It is a cold-blooded proposition. The employe has the same faculties as the employer and, given the proper education, he will use these faculties for those who have raised him up to a higher standard, and both employer and employe will be benefited financially.

Now, for the sake of argument, grant that this is true. I have seen, in my experience, many cases of real gratitude and faithful service; and where men are being changed continually, if among those who remain there are a few grateful ones, you can always see the result of their influence among the new men and can note the interest with which these new men receive instruction.

Now, as to this more effective method of teaching—it is a departure from theory, a shifting from the beaten track, and it may appeal to you more if referred to under the much-talked-of and less understood head of the psychological. It is not so much what we are going to recommend to be taught as to how it is to be done and who are the proper ones to do it. Any man who attempts to teach theory, or reads or repeats from memory, cannot accomplish the desired result. Those who are sent out to do this work should be men who have been doing it, who love the work. They must know the men they teach and this means that, when they talk, there is that mixture of intellectual exhiliration and personal touch which cannot fail to carry the interest of the men with the speaker to the end. Such an one is always gladly received. He has established that psychological, subconscious mind action in the men to such an extent that a perfect confidence exists and they go to him with their troubles as they know he has their welfare at heart. With such an influence once established, whatever is taught will be accepted and, where enough men of this kind are put out broadcast, much may be accomplished toward the adjustment of labor

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conditions. You want to know how this is to be done. Get the employer aroused, first, to the necessity for action, if he is not already awake. Form committees *only* of those in perfect harmony with you. Meet frequently. Perhaps some one who has the least to say, in time will bring forth the best idea. From these committees can be chosen the right men to send out to do this work and they will go without fear, without favor, to accomplish that which is firmly imbedded within their hearts. In committees where perfect harmony exists, there is a drawing power of mind which works outside of the immediate circle and if enough of these committees are formed throughout the country, they cannot fail of remarkable, if not marvelous, results.

This is the phychological result of perfect harmony.

PHILADELPHIA SUBWAY

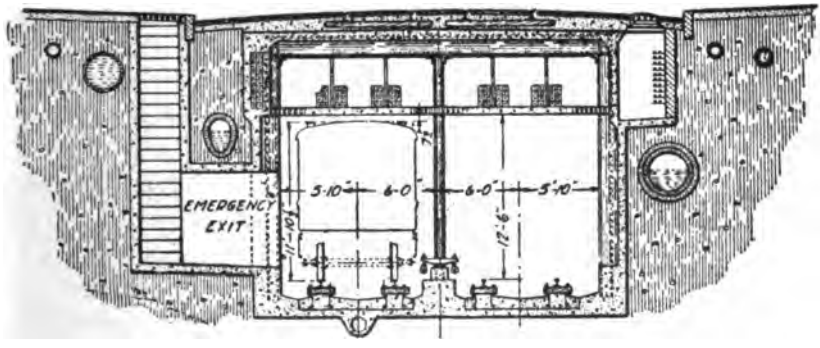
The engineers of the Broad street subway, Philadelphia, have planned to make the subway one of the safest of underground high-speed lines. Among other features, the plans call for emergency exits, entirely independent of the regular exits and entrances, to be located between regular stations. They will be placed about one-half mile apart and will be constructed along the entire length of the line, on both sides. Another safeguard for the public is the "refuge platform." These platforms will be located along the sides of the tube throughout the entire length of the subway; they lead directly to the regular station platforms.

These features, in conjunction with a thorough ventilating system, the engineers believe, will make impossible such accidents as occurred in the New York subway in January, 1915, when many persons narrowly escaped suffocation by the smoke from a short circuit.

Ventilation shafts will be constructed so close to one another that smoke or gases cannot collect in great quantities.

U. S. STEEL SAFETY RESULTS

At a conference held in San Francisco in connection with the Panama-Pacific exposition, it was announced that 12,000 men working for the United States Steel corporation are alive and have today the correct number of arms and legs and eyes because since 1905 the corporation had spent $5,000,000 to safeguard them. Although that is a large sum of money the corporation considers it a good investment. Leaving out all ethical considerations, the protective policy effects a tremendous saving. Besides the lawsuits and litigations that are sidetracked, it creates an atmosphere of satisfaction which is bound to react in favor of the employers.



The Philadelphia Public Ledger.

This drawing shows the cross section design of the Broad street, Philadelphia, subway exit, with a model emergency exit. The figures representing feet and inches show the dimensions of the tube.

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EFFECTIVE FIRE FIGHTING

THE accompanying illustration indicates a new nozzle system developed for private manufacturing plants, throwing a 2-inch stream a distance of 196 feet at the Great Falls Manufacturing Company at Somersworth, N. H.

It is clear that this new nozzle system is equally valuable for private corporation fire systems and for town and city service and has already been adopted by many of the largest manufacturing plants throughout the country. It is reported that the Draper Company at Hopedale, Mass., has over 20 of these modern deluge systems and that one man can direct four 1⅛-inch streams which previously required four men to apply.

According to Fire Chief Alexander Henderson, at St. Thomas, Ont., at a fire which broke out in the roof of a grain elevator, the streams from the ordinary nozzles were unable to reach it. The new deluge set was put to work and at once gained mastery of the roaring furnace.

At other trials at Fort Madison, Ia., a 2-inch solid stream was thrown a distance of 290 feet with 120 pounds pressure; at Waltham, Mass., a 1⅞-inch solid stream was thrown 263 feet with 90 pounds pressure; while at Iowa City, Ia., a 1⅝-inch solid stream was thrown 258 feet with 85 pounds pressure. At the Great Falls Manufacturing Company at Somersworth, N. H., as indicated in the picture, a 2-inch solid stream was, as stated, thrown 196½ feet from a hydrant with only 65 pounds pressure while a small boy was directing the nozzle.

As the lack of facilities for producing large streams is often felt in great fires, these deluge sets supply the requirements and it is claimed by prominent firemen they more than double the efficiency of the fire equipment that has already been installed.

GREEN FOR SAFETY

John E. Buck, St. Albans, Vt., writes to SAFETY ENGINEERING: "I have noticed in hotels and theaters a red light, the danger signal, is used to indicate safety—fire escapes and exits. It seems to me that green should be used for anything that means safety. Would the present use of red not be confusing to one who has been repeatedly told that red means danger?"

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EDITORIAL

Subway Collapses and Public Safety

THE recent disasters in the City of New York where street surfaces, for blocks, collapsed on account of blasts and rock slides coupled with insecure timbering, naturally arouses in the lay mind a fear that such calamities may happen at any time and in any part of the extensive subway building operations now under way in the city. Such fears, however, are not well founded. Investigations have shown that the two accidents, that is the one in Seventh avenue and the one in Broadway, are entirely dissimilar in character and not due to similar causes and, therefore, a recurrence of either is not probable.

The accidents raise other serious questions, however. From the expressions of various officials it would appear that there was something "mysterious" about the causes of the accidents—that the causes were not predeterminable. In other words, an attempt has already been made to show that both the contractors and the Public Service Commission had taken all precautions possible to forestall the happening of any such calamities. Now, as a matter of fact, competent engineers who have had experience with mining and tunnelling through various rock formations know there is nothing mysterious about accidents of this nature. They further know that no form of rock formation is dangerous if the proper placing of timbers and shoring is employed.

This brings us to a second question: "Is the present personnel of commissions, such as the Public Service Commission of New York—that, in the final analysis, are responsible to the public for safety in connection with operations of this nature—competent to deal scientifically with the problems involved? Is it fair to assume that four lawyers and a former promoter, who constitute the Public Service Commission in New York, have the experience fitting them for the important positions they hold?" It will be contended, undoubtedly, that they have the authority and the appropriation to hire engineers and experts competent to deal with any problem within their purview. Such is true, but why not put one or two such engineers or experts on the actual commission and make them directly responsible to the public?

It is an unfortunate fact that in no positions which involve direct responsibility to the public do we ever find the engineering profession represented, a circumstance due, we believe, to an exaggerated degree of modesty on the part of the engineering professions and their abhorrence of politics as usually known, a reticence not at all justified and one which it would be to the advantage of the engineering professions as well as the general public to have eliminated. Who would ever think of a Health Department without doctors? Such a Health Department would be an absurdity in the minds of all. Is it not just as reasonable that a Public Service Commission dealing primarily with problems involving intricate engineering questions should be composed at least partly of the engineering profession?

It is exceedingly unfortunate that, in the proposed new constitution to be submitted to the voters of New York during the coming election, it is proposed that the Public Service Commission shall be perpetuated on its present basis. It is wrong, fundamentally wrong, and the engineering profession owes a duty to the State to protest most emphatically. Engineers should cease to be content to shoulder responsibility without possessing authority.

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MAKING RAILROADING SAFE

By R. C. Richards, Chicago & North Western Railway Co.

The "Safety First" movement is five years old and because, through it, North Western men have begun to realize that their lives and their limbs are their most priceless possession, as well as the greatest asset the company has, they have, by their enthusiastic co-operation with the officers of the corporation, brought about safer working conditions and instilled in the minds of all employes the necessity of doing their work in a safe and careful way. The following reduction in deaths and injuries to the men who do the work has been brought about:

	Killed	Injured
July 1, 1909, to June 30, 1910 (before the "Safety First" committees were organized).	107	86,29
July 1, 1910, to June 30, 1911...	90	7,135
July 1, 1911, to June 30, 1912...	70	5,907
July 1, 1912, to June 30, 1913...	69	6,412
July 1, 1913, to June 30, 1914...	63	5,912
July 1, 1914, to June 30, 1915...	36	5,203

A statement showing the reduction in the number of accidents for the five years ending June 30, 1915, as compared with the five years on the same basis as the year ending June 30, 1910, before the "Safety First" committees were organized:

	Per Cent of Decrease.
80 fewer trainmen killed.....	42.1
7,941 fewer trainmen injured.....	47.9
43 fewer switchmen killed.....	47.7
566 fewer switchmen injured.....	17.4
23 fewer stationmen killed.....	76.6
735 fewer stationmen injured.....	20.1
55 fewer trackmen killed.....	39.3
2,499 fewer trackmen injured.....	28.6
3 fewer bridgemen killed.....	20.
562 fewer bridgemen injured.....	35.8
4 fewer shop and R. H. men killed	20.
1,048 fewer shop and R. H. men injured	16.3
4 fewer unclassified employes killed	11.5

But an increase of 5 car repairers killed, 769 car repairers injured, and 6 unclassified employes injured.

A total reduction of:

	Per Cent of Decrease.
207 fewer employes killed.....	38.7
12,576 fewer employes injured.....	29.1
3 fewer passengers killed	5.4
1,091 fewer passengers injured....	23.5
216 fewer outsiders killed.....	18.4
252 fewer outsiders injured.....	8.3

Totals: 426 fewer persons killed, a decrease of 24.1 per cent; 13,919 fewer persons injured, a decrease of 27.4 per cent.

In this statement all injuries to employes are counted where the injured person lost more than one day's time. No passengers were killed in a train accident during the last two years, in which time approximately 66,000,000 passengers were carried.

We have still much to do to make railroading the safest occupation men can engage in, but if we do as much in the next two years as we have done in the last two, we shall accomplish that result.

DANGEROUS SCAFFOLDING

Scaffolding, however simple, should be constructed with care. This picture shows a poorly arranged scaffold from which a workman fell to the ground, a

distance of 15 feet. It will be noticed that the beams on which the planks rest extend beyond the pipes and that they are not fastened in place. The workman stepped on the end of the beam, indicated by the arrow, and it tipped.

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THE PREVENTION OF ACCIDENTS IN COTTON MILLS

By John Calder, President, Manufacturers Equipment Company, Boston, Mass.

IN responding to an invitation to discuss The Prevention of Cotton Mill Accidents before the National Association of Cotton Manufacturers, founded over half a century ago, I have been interested in the extent to which the subject is represented in your past proceedings. Your esteemed secretary has selected and placed before me the references to a topic which must often be in the minds of mill owners.

These embrace two dealing with accident prevention. One is a brief record of some honored pioneers in the development of cotton mill equipment, and the other an analysis of three years' accident experience in twelve mills under one ownership. Incidental reference to prevention is made in addition in two papers by insurance representatives on methods of compensation and in one on mill management.

It has been said that death and taxes are the only human certainties and accident is a good third, but there is a healthy skepticism as to whether we have reached the irreducible minimum in the ratio of any of them. Public opinion, fortified by facts, insists that compensation at its best is a poor "cure" for accident and demands more "prevention." It is no answer to this in the twentieth century to say that the mill owner knows his own business best and that he needs no prompting or assistance from others. During the last decade safety engineering has grown to professional standing and the mill owner must prove his protective capacity, as well as assert it, by securing, as others are doing, progressive reduction in the number of preventable casualties.

The total industrial injuries in the United States are enormous and greatly exceed those of older civilizations, but the statistics, unless carefully analyzed, easily lend themselves to exaggeration and unjust conclusions as to responsibility.

This is the age of scientific method in business and the humanitarian argument will lose nothing of its force by the application of the former to ascertain the truth about industrial casualties. Confining myself strictly to cotton mills, let me ask what is the historical setting, what are the economic factors and statistics of death and injury in the industry, and what are we doing about it?

In both the Eastern and Western worlds the textile industry was, in the order of industrial development, the foremost in adopting power processes and self-acting machinery, and it has maintained this lead to the present time. No industry has so large a proportion of mechanical appliances per employe and in consequence, the risks attending all extensive use of machinery were first noticeable in the cotton industry and were soon found to be of a serious nature.

The machine cotton industry arose in England at the end of the eighteenth century. It did not imply the "cotton mill" as now existing, but it involved the rapid displacement by the factory system of production of domestic cotton working, which had been conducted with manual labor for at least one hundred years previous, and it massed the operatives in populous places and confined premises under unsanitary working conditions, which caused the serious deterioration of their health in a single generation. Early in the history of the machine cotton industry, the State had to step in to protect the child, both against its employer and its parents. The first factory act, largely a dead letter through lax enforcement, was passed in 1802 to abolish the exploitation of pauper children by local authorities who offered them on an indenture system to cotton manufacturers. The latter, carried away by the vista of great wealth, were unable to see to what this employment of young people of tender years

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for long hours at unremitting tasks would lead. This act, however, took no notice of the accident risk.

The epoch-making inventions, which made the cotton factory system possible, were quickly carried to New England, whose valuable water courses were soon harnessed to mills of a similar type. In England, where water power was poor and of relatively small volume, there were 188 water power cotton factories in operation in 1788. The first Boulton & Watt steam engine was placed in a cotton mill in 1785 and the perfecting of Watt's invention led, early in the nineteenth century, to great extensions in the factory system of cotton working, and intensified the previously existing evils under which the operatives suffered. The exploitation of children continued and the parents were equally desirous with the employers that this should be so.

In New England the large, valuable and economical water powers were for long the cotton factory sites and are still of great importance. The development of the industry here was more gradual, and the hardy native stock, which formed the first operatives, was consequently less affected by working conditions; novel alike to them and their employers. From the first, however, the cotton mill has been inherently a dangerous place, and little foresight was exhibited in constructing some of its mechanical appliances with due regard to the ignorance and eagerness of the agricultural laborers who flocked to the mills. The invention of cotton machinery and of the steam engine practically brought about an industrial revolution in both countries and it was long before the consequences to the operatives were generally perceived and reflected upon.

It was not until 1844, in England, and due to the labors of Robert Owen, a prominent cotton mill owner, and Lord Ashley, afterwards the great Earl Shaftesbury, and a few others, that any notice was taken by the State of the havoc wrought by injuries from machinery on the operatives. The evidence, however, was so overwhelming that in a legislature, in which the laborer had no control and little representation, the non-provision of certain safeguards was made a criminal offence. Even then the protection afforded extended only to prime movers and transmission, the actual cotton machinery not being dealt with. A step in the right direction, however, had been taken and the example of what could be done to safeguard, by giving thought in the whirl of wealth creation, was not lost upon many of the more enlightened and humane mill owners; but it was only through a succession of statutes, each strongly opposed and covering the next thirty years, that the legal right of the cotton mill operatives to have a healthy and safe workplace provided by their employers was established in Great Britain.

All this development had as its subject only cotton, and later other textiles, but it was seen by 1867 that no logical distinction could be maintained between these and the much larger volume of power manufactures which had sprung up with the advent of the steam engine; and the statute of that year made the safety and accident provisions identical for all factories. The lassitude which a twelve or fourteen hour day caused in women and children, predisposing to accident, was partly relieved by the ten-hour law passed in England in 1819, though negligently enforced, but it was not until 1874 that Massachusetts led the way in the United States with a similar law.

The industrial revolution in the United States did not reach its climax until about eight years after the Civil War. At that period employers' liability rested only on common law, factory restrictions were practically unknown and child labor laws little respected. In the meantime, a large part of our textile machinery was imported and it benefited from such protection as foreign makers had standardized. In other safety respects as late as 1874 protection was wholly dependent upon the initiative of mill owners.

It was not for thirty-three years after the first English statute providing for safety in cotton mills had been passed in Great Britain that the State of Massachusetts, always in lead in the United States in education and industrial bet-

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terment, first recognized industrial safety in its legislature by the Act of 1877, in which the main provisions of the English Factory Acts were duplicated.

For the next quarter of a century in the United States, after the Massachusetts Act of 1877, little legislative progress was made in the matter of safety, and conditions remained decidedly below European standards. Nevertheless, in individual plants striking improvements were effected by employers in cooperation with State officials, insurance undertakers, and manufacturers of machinery. The total of injuries, however, never fully revealed owing to inadequate reporting of accidents, could not be hid, and the great interest awakened a decade ago in the conservation of our natural resources speedily spread to the vital statistics of our industries, with results which have been felt all over the land through the attention of nearly every State legislature for the past five years in the form of laws, both wise and less wise.

During the quarter of a century following 1877, a great change for the better came over the English machine cotton industry, the stunted operatives of 1844 recovered their physique, the native stock persisted in their adherence to the cotton business and are now, in physical working conditions and inherited skill, the best body of textile operatives. A large part of this they owe to the body of English Factory Legislation, which, though stoutly opposed, placed the employers in the closely competitive cotton business on an absolutely equal footing, and enabled employes to demonstrate greater efficiency with a shorter working day and a safer workplace.

The development in the United States has been quite otherwise. The cotton manufacturers here have had to face a great industrial revolution, which they were powerless to control. The native stock raising its standard of living and ambitions gradually forsook the cotton mills and its place was taken in succession by a series of foreign races in the order of the immigration from Europe and practically in a decreasing order of intelligence and standards of living. It became difficult in some districts to procure any English-speaking labor, and this handicap (gradually extending to overseers as well) seems destined to become permanent. Nevertheless, it must be reckoned with for effective progress in industrial safety. We need more, not less, precaution in our cotton mills than in Europe. Many American employers in our textile and other plants have risen to the occasion and gone far beyond any local statutory requirements in their anxiety to cope with the situation. Special mention may be made of the United States Steel Corporatoin, which, in some of the plants, has had to cope with something like seventeen languages and dialects and has obtained remarkable reductions in casualties. The safety committee work of Ludlow Associates, one of your own members, will also well repay study by mill executives. Such cases, however, have been the exception rather than the rule. As a matter of fact the industrial tragedies of the forest, the field, the street, the factory, and the mine, for a long time weighed very lightly upon the American conscience. Employers, employes, and the general body of citizens were alike in responding chiefly to catastrophes and in having little concern to prevent the daily loss of life and limb during our great industrial development which obsessed us very much as it did the early cotton manufacturers in England and grew beyond all anticipation. Today, happily, the majority of employers in all our industries are deeply concerned to avoid accident to employes and they are guided by no narrow interpretation of the existing statutes. It is wholly in accord with the American spirit that so much has been accomplished without legal pressure in the last ten years of wide publicity on industrial injuries.

I do not propose to touch here on the subject of compensation for accident. Indeed, I do not believe that a compensation burden on an industry is in itself the creator of the best accident-reducing conditions, though the excellent technical assistance of the safety experts of insurance undertakers has been beyond question helpful. The wave of interest due to the recent incidence of this new economic burden upon the cotton indus-

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try is bound to subside, and sooner or later the consumer will foot the bill. As a matter of fact, it is not in the mill counting house, the State house or the insurance office, but in the mill itself and amongst the responsible executives there that we must look for the initiative that will procure the reduction of the present accident rate in cotton manufacture and a corresponding relief in compensation payments and insurance cost, not to speak of the moral gains.

It is well known that the economic factor has been and must still be the mainspring of the cotton manufacturers' progress as of all other industrial enterprises, but this does not shut out consideration of employes whose health and safety affect the long result. To an extent regretted by all mill owners, the mill is still to many of its operatives only a stepping stone and the seeds of precaution and of safety habits have to be sown largely on a moving soil.

For the statistical portion of this necessarily limited discussion I confine myself to the accident returns from the cotton mills of Massachusetts whose records are well maintained and whose casualty experience is not the least favorable to the industry. What then is the extent of the reported injury sustained in the cotton mills of that State which represents the most advanced safety practice in the industry? These mills employed between July 1, 1912, and June 30, 1913, an average of 112,384 operatives, of whom nearly one-half were females, and in that time 7,489 casualties were reported. Fatalities do not figure prominently in the cotton mill risk. In the above, thirteen males—two of them minors—were killed, and 7,476 persons more or less injured; the injury ratio being 66 per 1,000 employes per annum. Seventeen hundred and sixteen (1,716) of the accidents or 23 per cent occurred to females. Specific mutilation was sustained in eighty-one of the non-fatal accidents and involved the loss of four eyes, two hands, one foot, two or more fingers in twelve cases; one finger in sixty cases, and one toe in two cases. The other injuries varied from serious wounds and contusions to trifling hurts involving no absence from work.

The disability due to these injuries was under two weeks in over 76 per cent or in 5,711 cases; two to four weeks in 862 cases; four to eight weeks in 564 cases; eight to thirteen weeks in 205 cases; thirteen weeks to six months in 113, and over half a year in twelve cases.

This in brief is what happened in one year in the cotton mills of one State, and any helpful study of prevention involves the further questions: Where did these accidents occur, how and why, and what can be done in the premises?

Owing to the supreme place necessarily occupied by machinery in the cotton industry, it is desirable to isolate at once all trivial occurrences and these beyond remedy from physical safeguarding though not necessarily unpreventable by better supervision and instruction. When this is done we find that in Massachusetts in one year the three chief mechanical elements in all mills, viz., belting, shafting and gearing, caused three times as much lost time per employe in cotton mills as in the thirteen other leading industries (Table 1), and the element of gearing alone was four and one-half times more dangerous.

TABLE 1.—DAYS LOST TIME FROM INJURY PER 1,000 EMPLOYES.

Cause.	Thirteen Industries.	Cotton Mills.	Ratio.
Belting	21.7	43.6	2.
Shafting	12.4	30.2	2.4
Gearing	21.1	98.2	4.6
Total	55.2	171.9	3.1

If we compare the lost time in cotton mills from the above causes with that in another industry also using much machinery, we find the ratio is over five times and the special item of loss of time from gear accidents nearly thirty-four times.

TABLE 2.—DAYS LOST TIME FROM INJURY PER 1,000 EMPLOYES.

Cause.	Shoe Industry.	Cotton Mills.	Ratio.
Belting	20.0	43.6	2.2
Shafting	7.7	30.2	3.9
Gearing	2.9	98.2	33.8
Total	30.6	171.9	5.6

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Such economic facts should lead cotton mill owners not to rest on past achievements, but to organize more thoroughly than has been done to reduce these losses and others which they imply on both employer and employe. There are not lacking indications that the burden on the industry of compensation premiums will shortly be increased, owing to alleged unfavorable experience with the cotton mill accident risk.

In the cotton industry the amount of machinery investment per employe is much larger than in most others, and its speed and intensive use for production increase the chance of injury to operatives from machinery sources. The inherent mechanical risk of the industry is well recognized and is further illustrated by the analysis in Table 3 of 557 textile accidents reported consecutively in Massachusetts.

It was noted that in 192, or about a third, of these injuries, no lost time was caused; in 277, or one-half, the absence was under two weeks, and in 88 cases, or about 16 per cent, disability extended over two weeks.

It is not my present purpose to go into the details of the well-known methods for preventing, by more physical safeguards, a number of these accidents, but rather to urge such executive interest as will secure their constant application and improvement. The comparison made in Table 2, between cotton mill and shoe machinery gearing accidents, illustrates the results where the commercial responsibility for the safety conditions on leased machines lies wholly in the hands of the maker; in this case a single large corporation with a well-deserved reputation for care in this matter. On the other hand, though cotton mills might copy with advantage many of the protective precautions adopted with gears in the

TABLE 3.—ANALYSIS OF PARTS CAUSING 557 CONSECUTIVE ACCIDENTS.

Machinery.	Mechanical Elements Involved.								
	Rolls Cylinders.	Gears.	Belts. Pulleys.	Chains. Sprockets.	Pulleys. Flying Shuttles.	Fliers. Bobbins. Spindles.	Miscellaneous Revolving Parts.	Miscellaneous Reciprocating Parts.	
Openers and pickers..	6	5	5	1	—	—	4	2	22
Cards	21	19	7	2	1	—	—	—	50
Lappers	7	—	2	—	—	—	7	—	16
Combers	8	2	—	—	—	—	3	—	13
Drawing	7	6	—	—	—	—	—	7	20
Speeders	—	14	—	—	1	25	—	—	40
Spinning; twisting ...	18	12	5	—	—	55	—	2	92
Winders; quillers	3	3	2	—	—	2	—	—	10
Reelers	—	—	—	—	1	1	—	—	2
Slashers	3	3	—	—	—	—	—	—	6
Beamers	—	—	2	—	—	—	2	—	4
Mules	—	—	6	—	—	—	5	4	15
Looms	4	15	7	—	33	—	—	117	176
Marline layers	—	—	—	1	1	2	—	—	4
Dye plant	19	2	—	1	—	—	—	—	22
Printing	2	2	—	—	—	—	—	—	4
Calenders	8	—	—	—	—	—	—	—	8
Cloth winders	4	—	—	—	—	—	—	—	4
Folders	—	—	—	—	—	—	—	21	21
Shearers	—	—	—	—	—	—	5	—	5
Miscellaneous	3	3	5	—	—	2	8	2	23
Total	113	85	41	5	37	87	34	155	557

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shoe industry, the cotton accident risk is distinctly increased by reason of the multiplied places at which a single worker may receive injury as compared with a shoe machinery operative. These considerations are mentioned in order to make fair comparisons, which cannot be done by quoting statistics alone.

It is worthy of notice that 120 of the above accidents or, more than 20 per cent of the total, occurred while operatives were cleaning machinery in motion, a cause of accident much more prominent in the textile industry than in any other. The technical necessity to clean at frequent intervals in order to maintain quality and quantity of product, the economic disadvantage of idle machines, the interest of employe, employer and frequently overseer in the earnings due to absence of stoppages, all tend to make cleaning in motion one of the problems of the industry. So difficult has it been to prevent such dangerous employment even where both the intention and the action of the management have been directed towards safety that mechanical solutions of the difficulty have been sought. Where no strenuous effort is made administratively to check cleaning in motion, it goes on daily as a matter of course with inevitable accident.

The administrative solution demands a good deal closer supervision and education of employes than overseers, as a rule, have been able or willing to give to the matter, and, unless mill owners take up the issue vigorously, little improvement can be expected from executive handling of the class of labor now available for textile operations.

The mechanical solution is a sure remedy for a number of the frequent injuries due to cleaning in motion. It involves considerable expense. It will not take care of the risk due to permitted cleaning in motion of main line shafting and transmission, but it does solve a large part of the cleaning accidents. It consists in developing interlocking machine and gearguards which automatically prevent the application of power to any machine while the guards are removed or are opened up for cleaning purposes. There is nothing new in the principle, which has long been applied to military apparatus and many other types of dangerous appliances. It is applicable alike to gearguards, roll covers, clothed cylinders and parts running at high speed which can cause serious injury even after the power is shut off. Machinery builders will gradually standardize such appliances if mill owners will take the initiative and specify them on new machinery, but they are sure to be omitted if the buyer exhibits no interest in this regard. Interlocking devices have already been applied to openers, pickers, cards, lappers, doublers, drawing, slubbing, roving and ring spinning frames, etc. Wherever they have been insisted upon they have been forthcoming, and it is a significant commentary on the influence of factory legislation in effecting improvements that twenty years ago Russian cotton mills were importing safer machinery than we now use because of the strict safety regulations under which that nation permitted exploitation of the moujik in textile mills.

Wonders in accident prevention have been already accomplished by plant owners in other industries, comparing in every respect with the experienced, intelligent and privileged men who own and operate our cotton mills. The textile industry owes it to itself to get busy on this matter and I have no doubt that, as the consumer must foot the bill in the end, the nation will not be unwilling to bear a share, though it will probably, in the future, scrutinize most closely the itemized particulars of any claim for assistance.

This analysis of cotton accidents and their prevention would not be complete without frank recognition of the moral risks involved in the industrial world. I have investigated many thousands of accidents, both in the textile and non-textile industries, and the blame is pretty evenly divided between careless employes and neglectful employers. The chief causes are ignorance, carelessness, fatigue, unsuitable clothing, insufficient lighting, unsafe structures, obstructed and defective floors, dangerous machinery, dangerous operations, absence of safeguards, and not least, absence of safe-working supervision.

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In a great many instances the carelessness and ignorance of operatives are contributory and cannot be offset by physical safeguards or legal enactments, but they can be greatly reduced by painstaking instruction and supervision. The National Safety Council, and the affiliated Boston Safety Society of which your worthy president is a vice-president, consists of employers in every description of industry and their responsible executives and engineers who have set themselves to get at the truth about industrial accident and who will accept nothing but facts. They have got them a plenty. They are after "prevention," not "cure," and they include in their membership the best safety experts in the country who give their services and advice to the council, free of charge, for industrial betterment.

What our textile mills need in the first place is an awakening of interest amongst mill superintendents, foremen and overseers in safety work. In spite of the age of the machine cotton industry and its long acquaintance with accident, it has not taken the place it should have done in the modern safety movement. It was the first to experience and combat the industrial dangers due to power industry and it ought to be in the front rank today in co-operating with other industries in solving what is a common problem, which demands enlightened executive action, rather than reliance upon pressure from the State, which can never be more than an advisor and inspector of performance. The safety committee on which operatives from various departments serve, along with executives, the Safety Suggestion System, the organization of workers against dangerous practices, are conspicuously absent in many cotton mills where more expensive attempts to safeguard are not lacking. We need to take greater advantage of our moral resources in the mills and to profit by the increasing knowledge about the psychology and physiology of industrial accidents.

In all the work the societies I have mentioned undertake, they lay emphasis upon the conversion of mill executives to an active propaganda and on the absolute necessity for socializing the safety movement, which required for success the pooling of industrial accident experience and a co-operation of forces which no legislation can procure. When the cotton manufacturer has complied with the minimum legal safeguarding provisions and has posted various prohibitory notices in his plant and drawn the attention of overseers to the State restrictions upon employment about machinery, he has only touched the fringe of the subject. It is still necessary for him frankly to recognize and apply his mind to the continuing casualties in his own and other mills, to challenge every assertion that reduction is impracticable and to be the foremost in inoculating his staff with a spirit of hopefulness and ambition in all matters of industrial betterment.

If the man higher up does not find time to do this, then nobody will, but, if he becomes a convinced advocate of the new safety measures and realizes his privilege and responsibility, he will effect changes which will react upon the whole spirit of his establishment and will greatly aid in the solution of the admittedly serious difficulties at present experienced in training and retaining the only labor now available for textile operations.

PACKING AND SHIPPING EXPLOSIVES

A Federal law enacted in 1909 provides a maximum penalty of $2,000, or imprisonment from 18 months to 10 years for violation of the regulations concerning the packing and shipping of explosives of any kind. The employes of firms manufacturing and dealing in such goods, as a rule, are not sufficiently impressed with the importance of handling explosives with care and for the purpose of educating them in this respect, H. F. Estes has been employed by the American Railway Association to deliver lectures in cities where much of this work is done. He shows the proper manner to pack, handle and ship all explosives which may be dangerous to life. Stereopticon views illustrate how the work should be performed, and some of the disastrous results of using improper methods.

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TEACH SAFETY IN THE SCHOOLS

Editor SAFETY ENGINEERING: With great interest I have read your magazine, SAFETY ENGINEERING, and it has been always a surprise to me why safety practices have not been taken hold of long ago by the schools and colleges.

When I was at a technical college in Amsterdam, Holland, in 1896, nineteen years ago, I remember that, the last year, students went in a body to the Safety Museum at that place and the professor explained every safety device to the class. It was quite a building, too, for scaffolding for buildings was there shown in actual size.

It seems to me that safety eningeering should be taught in the grade schools from which we get most of our workmen. It is easier to teach the young boy than the grown man.

Considering that the foreman on the job is naturally the first intelligent person to whom an accident is reported, he should have a first aid box in his office and should know how to use it. This will prevent infection and too much loss of blood to the victim.

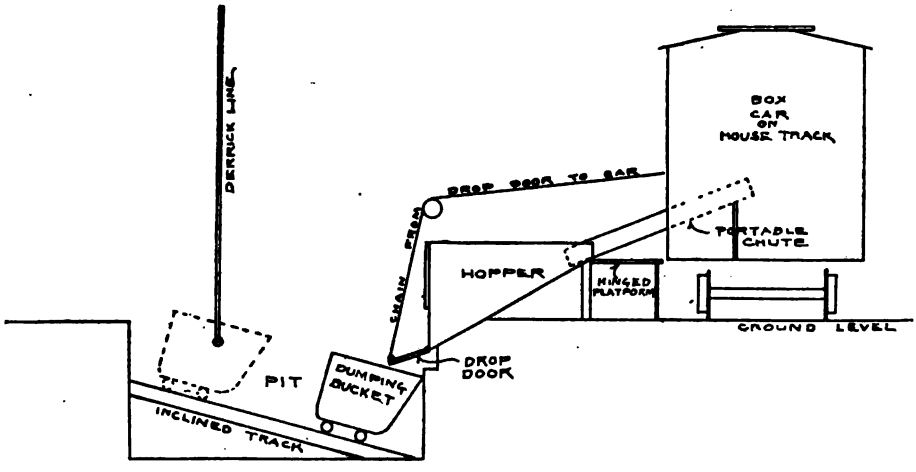
JOHN VANDEMOER,
Eng. Dept., El Paso Smelter.

SAFETY IN UNLOADING COKE.

The president of the Des Moines Gas Company describes the installation of an arrangement designed by G. I. Vincent, whereby coke is unloaded from railroad cars with almost absolute safety, and at the same time with increased speed. The diagram illustrates the principle of the arrangement.

A pit was dug in the ground near the railroad siding, and in the end nearest the siding a steel hopper was placed, having a drop door at the bottom. Two tracks, or rails, were laid in the pit, inclining toward the hopper, and the coke bucket was equipped with rollers instead of wheels. A rigging was designed which causes the bucket to drop exactly on the tracks and run under the hopper in proper alignment. A portable chute is used, extending from the hopper to about the centre of the car. As soon as a bucketful of coke has been shoveled into the hopper, one of the men drops the door, by means of a chain leading into the car, and the coke runs into the bucket. The drop door is then closed and the men continue shoveling while the full bucket is being hoisted, dumped and returned. The equipment eliminates the danger of the bucket falling at any point where a workman would likely be.

The safety department of the United Gas Improvement Company says that about a month after the new hopper was installed, the derrick cable broke and a bucket of coke, weighing about 3,000 pounds, dropped into the pit, but resulted only in a slight displacement of the inclined tracks. Under old conditions a similar occurrence would have been very likely to have caused serious personal injuries.



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"WHAT TO DO IN CASE OF ACCIDENT"

TO STOP BLEEDING

1. Lay person flat on cot or floor.
2. Strip all clothing from neighborhood of bleeding part.
3. Make pressure just above point of bleeding (between same and body.) This is best accomplished by applying a compress of gauze or cloth to the blood vessel above the site of bleeding and holding this in place by a tourniquet (a towel may be used in emergency). Tie ends together and by means of a stick twist ends, thus tightening tourniquet. By thus exerting pressure on the pad, the blood vessel is compressed and the bleeding controlled.

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LIFE SAVING MOTORCYCLE

LIFE saving by motorcycle is the method employed by the crew at Redondo Beach, California, where a ma-

The Side Car Ambulance.

chine with a speed up to 70 miles an hour is in service, carrying two men, a side-car ambulance, a pulmotor, a life buoy and cable; in fact, a complete equipment for rescuing victims from the surf and restoring them promptly.

Getting Water from Victim.

The outfit was designed by George Freeth, a noted swimmer of the coast, who was the first to put it to use. It is stationed at the bath house of the resort, where an emergency hospital is installed to care for serious cases. As miles of beach are used by bathers, the life-saving crew is in touch with smaller resorts and private homes by telephone, so that a call from a considerable distance can receive quick attention. It has been a serious handicap, heretofore, that the life guards had to run or row to the point of danger, limiting their field of usefulness and causing them to arrive somewhat fatigued. The motorcycle takes them without exertion, leaving the swimmers fresh for the battle with the surf. The mode of operation is this: the machine is run as close as possible to the person struggling in the water and one of the guards swims out to him, trailing a metal buoy at the end of a 1,500-foot wire cable, very light and strong. The second guard unreels the line, and as soon as the victim is reached, he winds it in again, the buoy supporting both persons in the water. If necessary, the stethoscope is applied to determine whether life is extinct; the

Applying the Stethoscope.

pulmotor is used to restore the vital spark, and stimulants are applied. Of course the well-known process of getting the water out of the half drowned person is the first thing done; one of the guards going down on his hands and knees,

Applying the Pulmotor.

while the victim is laid across his back. If first-aid methods fail, the victim is rolled in a blanket and laid upon the ambulance side-car to be rushed to the emergency hospital at a mile-a-minute speed.

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TESTS OF LENSES FOR FOUNDRY GOGGLES

Address by F. W. King, New York, Before American Foundrymen's Association.

FEW foundrymen realize the tremendous advances made the last few years in the design and construction of goggles used to protect the eyes of chippers and other foundry operatives. A comparatively short time ago almost anything in the form of a 10-cent spectacle was considered quite proper, and only recently has the importance been realized of using lenses of ground optical glass, especially heat-treated to withstand a heavy blow. Contrary to the general belief, only a few types of goggles are provided with such lenses. Some foundries are still using masks or protectors made of wire mesh, but as a rule, they are being rapidly abolished, as the men complain that constantly looking through a screen tires their eyes and it is a fact that a screen cuts down the illumination 30 per cent and makes vision bad enough to be dangerous to safety welfare. The price of a goggle no longer is the first consideration. Competition is too keen for the goggle manufacturer to charge a fancy price for them. More than 100 types of goggles are on the market. the cheapest being sold at about 75 cents a dozen and the best at $11 a dozen. Large quantities are sold on a scale down according to the number ordered. The cheaper type is worth possibly 75 cents, certainly no more. Like anything else, one receives just about what he pays for. The finest goggles are the best value to be had for the investment. Costing a little over 90 cents a pair wholesale, the same quality of goggle would retail at about $2.50.

No large concern, progressive in safety work, considers anything but the best. Frequently, the loss of an eye, through the use of improper goggles, costs enough to properly equip a county with goggles, to say nothing about the humanitarian features of the case. Generally speaking, the largest manufacturers are furthest advanced in safety eye protection and on account of the great hazard involved in the employment of a large number of men they have demanded better and stronger goggles and lenses than at first could be furnished.

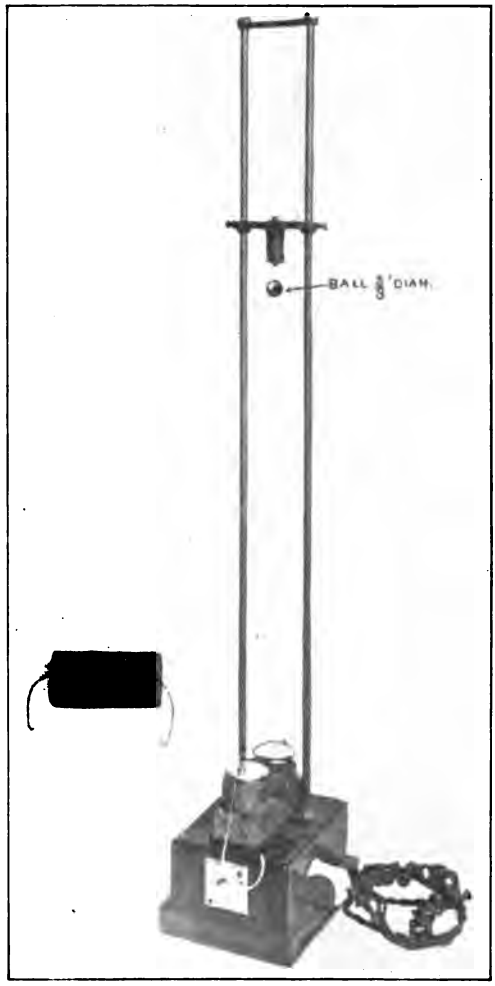

Fig. 1. Lens Drop Testing Machine

The first requirement was that the entire frame, including temples, etc., had to be made of metal that would neither tarnish nor rust, so that it could be properly disinfected. This was not an especially difficult proposition and it was successfully worked out.

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Now the entire frame, including the screens, is made of special German silver alloy, which meets all requirements.

The United States Steel Corporation was the first to adopt a standard of required strength for lenses, and other large manufacturers have drawn up similar specifications. The Illinois Steel Company, Chicago, has designed a drop test machine, Fig. 1, for testing lenses with a steel ball, magnetically relieved from a height of 21 inches.

HOW THE TEST IS MADE.

The test is made as follows: Out of every gross of goggles received, one

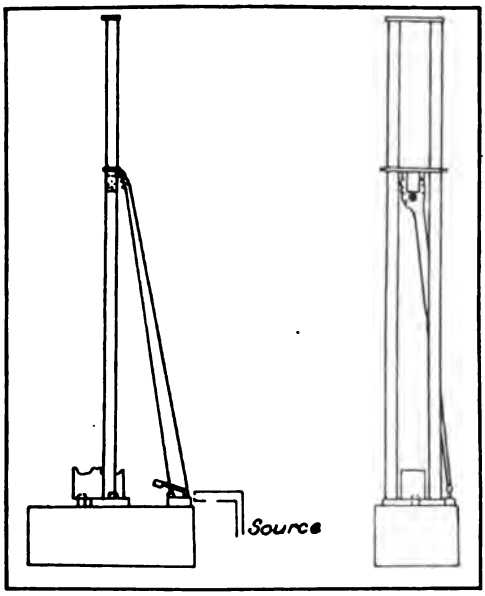

Fig. 2. Goggle Testing Apparatus. Diameter of ball, ⅝-inch; weight of ball, 16.25 grams or 0.0359 pound; height clear drop, from bottom of ball to upper surface of glass, 21 inches; energy per blow, 0.752 inch-pounds.

dozen are selected at random and the lenses of 25 per cent of these must stand, without breaking, fifteen 21-inch blows of a ball weighing 16.25 grams. When the glass is broken the pieces must hang together and not splinter or fly in towards the eye. If the goggles will not pass the test, the whole shipment is refused. While some lenses would pass this test, it was agreed by manufacturers and users that stronger lenses would be desirable and as the result of a large amount of research lenses have been developed which will withstand a much greater impact than that provided by the Illinois Steel Company's specifications.

The Workman's Compensation Service Bureau and the Compensation Inspection Rating Board of New York recognize the importance of the use of goggles and respirators in industries where the eyes and lungs of workmen are exposed by allowing a 1 per cent credit on the insurance rate. The clause referring to this credit in the Universal Analytic Schedule, follows:

"In all industries where necessary, and where workmen are furnished with approved types of goggles and where those engaged in dusty places are furnished with respirators, 1 per cent credit on insurance rate."

The importance of this cannot be overestimated. Realizing the cost of goggles, the recognition of the liability companies is certainly a fair one and offers financial inducement to the employers to furnish their employes with eye protectors of approved types.

Further details may be had by reference to the "Universal Safety Standards," Machine Shop and Foundry edition, page 287, issued by the New York Workman's Compensation Service Bureau.

In addition to the standard already outlined, the Underwriters' Laboratories have adopted specifications which form part of this paper.

It will be noted from the foregoing that considerable thought and attention have been given to this important subject by institutions absolutely unprejudiced in the standardization of goggles, and it is suggested that the American Foundrymen's Association might do worse than adopt these same specifications. The specification of the Underwriters' Laboratories only recently have been issued and they are much more rigid and exacting than those previously adopted.

It might be added that there has been considerable criticism of the drop test as not reproducing correctly the blow of a chip of steel traveling at a great velocity. A similar test of lenses is made by the use of a pendulum, and

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by lengthening its swing, any desired impact may be reproduced. Lenses which satisfactorily pass the drop test also pass the pendulum test.

Lenses have been developed, which not only will pass the impact test of a

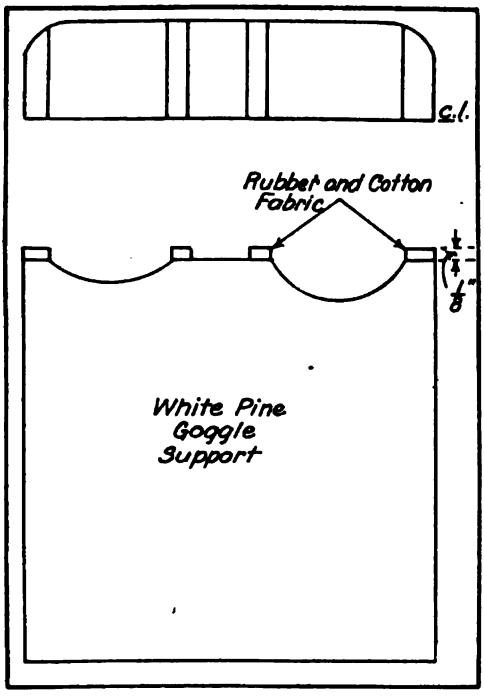

Fig. 3. Top and Side Views of Goggle Testing Support

1-ounce ball, ⅝-inch in diameter, but will not break from the force of a blow of a 9-ounce ball, 1½ inches in diameter. The test is almost unfair, since the goggles are mounted rigidly on a hard rubber pad, whereas in actual use, when a blow is struck, there is a spring of the goggle in addition to the padding afforded by the skin and flesh of the wearer.

SPECIFICATIONS FOR CHIPPERS' GOGGLES AND DESCRIPTION OF TESTING MACHINE ADOPTED BY THE ILLINOIS STEEL COMPANY, CHICAGO.

1. The drop test machine consists essentially of a support for the goggles, made of white pine; the support is designed to accommodate the goggles under test in such a manner that the frame of the goggle is given proper bearing on the rubber and cotton composition strips, without permitting the lens itself to rest on the support or to receive any "backing," other than that naturally given by its own frame. A representative form of support is shown in Figs. 2 and 3.

2. The height of drop shall be 21 inches from bottom of ball to the surface of the goggle lens.

3. The ball to be made of steel and hardened. The diameter will be ⅝-inch and the weight not less than 16 grams. When releasing the ball it must fall freely without any initial momentum.

4. Extreme variations allowed in the thickness of a single lens, O meter 0.0005. The measurement of the thickness to be taken with a standard gage used by opticians at five points, as shown in Fig. 4.

5. Extreme variations in thickness allowed between two lenses of the same pair of goggles, O meter 0.0001. The measurement of the thickness of each lens to be taken as described in paragraph No. 4.

6. The maximum number of blows to be given is fifteen; the blows to be given consecutively on the center of the lenses and on the surface of the lens which is exposed to flying matter.

7. On each shipment of one gross or

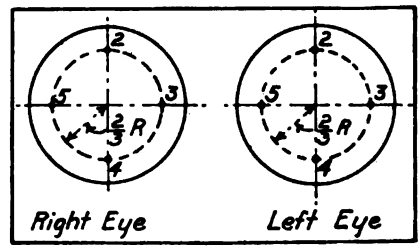

Fig. 4. Points at Which Lens Thickness Is Gaged

more of goggles, one dozen of the goggles, must be tested as described in paragraphs Nos. 4, 5 and 6, and of this dozen, 25 per cent, or three pairs of goggles, must stand fifteen blows without breaking or cracking. This means that the six lenses of the three pairs of goggles in the test dozen must

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be intact after fifteen blows. If less than 25 per cent stand the test the entire gross will be rejected.

8. If in the test dozen of goggles any goggles break under the drop in such a way that glass will fly from the inside surface of the lens—meaning the surface which is next to the eyes of the man wearing the goggles—then the entire gross will be rejected, even if three pairs of the goggles have stood the number of blows required in paragraph No. 7.

9. The cost of the dozen of goggles used for the test will be divided equally between the goggle manufacturer and the purchaser, providing the goggles stand the test. If they do not stand the test, the cost of the rejected dozen will be borne entirely by the goggle manufacturer.

The testing is to be done under the supervision of the buyers' representative.

TRANSFORMER SECONDARIES

"On August 19," says S. M. Dean, electrical engineer of the Mutual Fire Prevention Bureau, "I made a trip up to Gladwin, Mich., for the purpose of investigating a statement in a newspaper clipping which stated that a workman employed by the Gladwin Elevator Company had been killed by leaning against the metal sheeting of the elevator which had become charged from some incoming electric wires. Upon arriving at the plant and investigating the situation I found several points which I think will be of general interest. The plant in question is a 2-story iron-clad elevator, the iron-cladding on the west side coming down close to the ground, which was moist at the time of the accident. The lighting wires were brought into the building through circular looms passing through the elevator cribbing below the hoppers of the bin and then to the entrance cabinet. When the bins were loaded they settled slightly and caused the iron-cladding to creep along the outside of the elevator and thereby shear through the looms in through the wires leading into the building. The transformers which feed this building also have a set of secondaries running down the street in opposite directions and on August 12, the date of the accident, these secondaries became crossed with the primary wires, thereby carrying the primary current into the sheeting of the elevator through the lighting entrance. A few minutes later one of the workmen got up against the iron-cladding and was almost instantly killed, and later it was discovered that there were several small fires starting at the bottom of the iron-cladding on the wet side of the building. Had this condition not been discovered immediately the plant would have been afire along one side where the iron-cladding came near the ground.

"There are several points brought out by this accident:

"(1) Had the transformer secondaries been properly grounded with wire at least as large as the secondary wire this accident could not have occurred.

"(2) Had the elevator iron-cladding been grounded at the four corners it would also have prevented this difficulty.

"(3) That where any wiring is being installed in cribbed iron-clad elevators we should insist upon a conduit entrance through the buildings, in order to prevent the iron-cladding from shearing into the incoming wires.

"This is one more incident to show that the grounding of transformer secondaries is vitally necessary and that the lack of the same constitutes a very definite fire hazard."

VENTILATION AND LIGHTING

Why should any man lose his life because the surrounding air in the place where he is working has become poisoned and has consumed his vitality to such a degree that it is making him less alert to his duties and danger? Ample fresh air is provided for all human beings, if we but avail ourselves of it; and where it cannot be obtained by natural means, the ventilating engineer should be able to solve the problem. With our knowledge of electricity today, is there any excuse why insufficient light should ever be the predisposing cause of an accident?

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THE MAN ON THE JOB

SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 191 How Much Does Safety Pay?—To err is human, to save divine (with apologies for the slight correction). In following this axiom it would seem in recent years that we have had entirely too much of the class of humanity that errs and thereby costs misery, degradation and hardship to a very large number of people. We have concluded to switch now and to begin to be divine by saving. It can be done and Safety Engineering and other effective agencies are making themselves heard and felt.

I am going to show what burdens the different industries are carrying and why safety is a good thing, aside from a human standpoint.

Most of the gentlemen who head our great and near-great concerns are "show-me" chaps, men who have climbed the ladder of success by a process of getting results. In other words the world progresses only as a given thing is demonstrated, and personally I have found that dollars and cents weigh very much in the balance. It is not intended here to imply that any man or set of men will or would put money above human life. I am not one of those who believe that, but a large number of people think that safety men are fanatics and we must, so it seems, save them even from themselves.

It is up to the safety man to show the facts and the facts must be figures represented by dollars and cents. To do this I use the year 1913 as a basis and my terms will be in round figures. Industry claimed in that year:

Fatal accidents	32,000
Serious accidents ...	300,000
Minor accidents	2,000,000

Using a system of my own I have arrived at the result that lumping all accidents together and eliminating the minor accidents, each accident of a fatal or serious nature costs all parties at interest about $1,300 or a grand total of $431,600,000. This is what our country at large pays out each year in some form or other for its recklessness, or the national trait of taking a chance. It takes about $8,632,000,000 of capital at 5 per cent to pay this loss. Some figures, eh?

Many of you will say I am wrong. If you don't believe me, study as I have for years and compile your own figures and look at them from every angle and see if I am not almost right. I can show one concern, for instance, that has achieved a net saving of $250 per accident in casualty expense alone to themselves on over 10,000 accidents, after deducting all the expenses of their safety department and all expenses incident thereto. That leaves out all such things as the wages of the men, the cost of litigation and doctors' bills that might have had to be paid which would very easily multiply their figure of savings by four or five.

The next point is how is each industry affected individually? I will not attempt to give them all to you, but I will enumerate enough to show you what a tax this burden is on some of them.

The table on the following page gives, first the industry, the number of men working in that industry, the number of men killed and injured in one year (1913), the total expense of the accidents and the cost per employe per year to maintain this tax or burden.

After looking this over and with the knowledge in your hands that from 50 per cent to 70 per cent of accidents can be eliminated you are in a position to show whether or not safety pays.

If you adopt a system of accident prevention do not expect these results all at once. You will not get them at once, but persistent effort will get them for you after a time.

What other proposition is there in this country today that will give such tremendous results? You can put it up to any manager or board that it does not make any difference if they haven't had an accident for a year or two years, that their particular industry as a whole has

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Name of Industry.	Number Employed.	Serious Accidents, Including Fatal.	Accidents Per 1,000 Employes.	Total Cost to Industry.	Cost Per Year for Each Employe.
Metal mines	170,000	8,840	52.0	$11,560,000	$71.35
Coal mines	750,000	36,205	48.3	47,345,000	59.46
Railroads	1,750,000	54,600	31.2	71,400,000	40.52
Electricians	68,000	1,989	29.3	2,601,000	35.29
Quarries	150,000	3,315	22.1	4,335,000	28,88
Lumber	531,000	10,361	19.5	13,549,000	25.49
Construction	1,500,000	24,375	16.2	31,875,000	20.24
Drivers, dray and teams	686,000	8,918	13.0	11,682,000	16.99
Street railways	320,000	4,160	13.0	5,440,000	16.99
Firemen and policemen	200,000	1,950	9.7	2,550,000	12.74
Telegraph and telephone	245,000	1,599	6.5	2,091,000	8.50
General manufacturing	7,277,000	23,647	3.2	30,923,000	4.24
Agricultural	12,000,000	52,000	4.3	67,600,000	5.63

Taking industry at large it takes $26,000 of invested capital at 5 per cent for each employe to sustain this loss.

borne and is bearing its pro-rated share of every accident to that industry as a whole. Further, collectively, we all contribute to this enormous loss, because as a social body, we are the ultimate consumers and they are the ones who finally pay the freight.

Following this line of reasoning it is a good thing for every one to push the "Safety First" campaign because it pays and pays big.

What attitude do you suppose the United States government would take if there were any loss to National resources such as this? We know what the most of the big corporations think because a lot of them are giving us their figures to prove their contentions and are spending money to back their judgment and knowledge in safety work.

What we have got to do is convince the sceptics, the fellows who think "Safety First" is a fad or an advertising scheme. Show them that lack of safety is a bunghole where a lot of the big leaks are occurring while they are watching the drops from the spigot of plant economy and efficiency.

The only real efficient and economical man is a safe man. He is safe all through and around.

Safety pays in money. It pays in happiness. It pays in a better grade of citizenship. In fact it pays anyway you look at it.

So let us make Safety a principle of business, *our first commandment:* Thou shalt have no other rule before me—"Safety First."

No. 192. To Broaden the Education of the Insurance Inspector.—The articles on The Man On The Job have certainly got me interested in the "Safety First" movement, and I must say that Safety Engineering is one of the best magazines an inspector can read. It is endeavorign to educate the safety engineers, and the information obtained from its pages is most beneficial to an inspector. I would like to make this suggestion: As Safety Engineering is doing all it can to help us I think we, as inspectors, should do all we can to help one another and at the same time help Safety Engineering.

At present the different insurance companies have men in most all the States throughout the United States who are handling all branches of business. Possibly the man in the Eastern States is handling branches that the man in the Southern States never saw. As we all want the broadest knowledge of the work we are following, I would suggest that there be some plan devised whereby the safety engineers in the different parts of the United States will take turns monthly in sending to Safety Engineering a complete report on some branch of industry that they inspect in their territory, with a detailed description of the operation. And, with the description, take the most hazardous machine in the plant and give a description of the machine. If possible, give a drawing,

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with each part lettered. Give the process of operation, pointing out the places where the hazard is considerable. For example, let a man in the New England States give a report on a Stone Quarry, with a detailed description of how the stone is handled and how the blasts are taken care of. Let a man in the Middle States give a report on a Flour Mill and its most hazardous parts. Let a man in the Southeastern States give a report on a Cotton Mill or a Rice Mill with the most hazardous points. Let a man in the North Central States report on a Copper Mine or a Lead Mine or a Smelter or a Distillery. Let a man in the South Central States report on a Cotton Gin or a Cotton Seed Oil Mill or a Sugar Refinery. A man from the South Central States could report on a Lumbering operation and he would have no trouble in finding some dangerous machines to describe. The Western States' greatest industry is Mining and Smelting, which is true of some other States. As we do not want to slight any of the men on the job, it would be a good idea for the Western man to report on something that other fellows have. In this way we can get one another's ideas of the way we are handling our work—all of which is instructive.

About the first thing an insurance company looks for in an inspector is efficiency to handle all the lines he carries; and it is seldom a company can pick up a man who is acquainted with all branches of industries. I do not know of a better plan for the men on the job to become partly acquainted with general inspection work than to get hold of an intelligible, detailed description of things that he has never come in contact with, written by an inspector that has actually been on the job and has seen the operation, just as it is, and who will report facts. In this way, if by chance we should be transferred from one part of the country to another, where our work is to be different to what we have been used to, we would not go groping through a plant like a chicken in the dark, but would have some knowledge of the way the business is carried on. We would have a better idea of where to look for trouble, be more efficient and give our employers better service.

One of the most embarrassing things to an inspector is to have to inspect a plant of a kind that he has never been in before. He has to ask the man who accompanies him what this machine is and what it is used for. Possibly there are several such machines in the plant, and at the end of the inspection the inspector happens into the engine room. While the rest of the plant is in good condition as to guarded machinery, here a large flywheel is found with a passageway all round it with no means of keeping employes from falling into it. We take the matter of guarding this wheel up with the man who is with us and he possibly will agree to comply with our recommendations, just to get rid of us. We send in our report to our company. It immediately sends our recommendations back to the assured, recommending the guarding of this flywheel. Then the assured will come back at them, and say, "From the knowledge exercised by the inspector during his visit to our plant we do not consider him capable of making recommendations in our plant, as we think this was the first plant of the kind he ever saw, and we do not consider his judgment very sound."

Of course, we do not have to know what a machine is to see how it is operated and see the dangerous defects about it, but to make an intelligent report we always like to have the name of the machine we are describing, and, we have to ask someone in the plant if we do not know ourselves.

All these points are little blights on records. The assured who looks at this matter, as above, is not altogether to blame. Possibly the man has been in the plant for years and has been too busy to get away from his business to see other plants of more modern construction, and he has never gotten the "Safety First" movement in his head. Now, after we make our inspection, this man wakes up to "Safety First." He gets it good and strong. He wants

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to put in new and up-to-date machinery, or get his old machines put in better condition. His insurance has nearly expired with the company we represent. He still remembers having to tell us what that machine was and what another one was. Having awakened to "Safety First," this man naturally wants to be insured in a company that can give him the best ideas on the "Safety First" line. The chances are our company will lose his business on account of our not knowing what the names of his machines were and what they are used for.

If we had seen some other man's report on a risk of this kind, with these machines described fully; if we could have entered this man's plant with some knowledge of the machinery in the plant, we might have been the means of holding the business and at the same time have the guard placed around the flywheel.

While it is an inspector's duty to educate employes to a certain extent when he is inspecting a plant, it is somebody's duty to educate the inspector so he may be capable of educating both employers and employes. I think SAFETY ENGINEERING is doing more in this line than any other medium I know of, and the inspector who keeps up with the articles in this magazine is getting an education in safety inspection work at a less cost than he could in any other way. I think if we would co-operate with SAFETY ENGINEERING in this glorious work, it would be one of the greatest things that ever happened to educate the inspector and assist him in imparting unto others his knowledge of safety appliances and the necessity for carefulness in the mills and workshops throughout our country. A safety engineer does not only have to know how a machine is operated and see that the dangerous parts are guarded, but to complete his inspection he should take into consideration the existing conditions in and around the plant, especially the conditions of the passageways around the machinery in the plant and the class of labor employed in the plant.

It is a common saying that there is no foolproof guard. It is quite true. I have seen men do things that it would seem a man "with one eye and no sense" would not do. To have the proper efficiency an inspector should be so well educated in his duties that the slightest out-of-the-way move by an employe, in a plant he is inspecting, should be noticed and the man's attention called to the danger that can come out of a move of that kind.

In the above suggestions as to reporting risks to SAFETY ENGINEERING, it would not be a bad idea for us to report the foolish capers of employes which come under our observation that all may be posted on accidents that have been sustained from such actions, and be able to lend assistance in educating employes not to indulge in these foolish habits. I think if we can arrange to have our most hazardous risks from the various States reported and described in our most valuable magazine, SAFETY ENGINEERING, it will add wonderfully to the education of all concerned and lend a helping hand to the "Safety First" movement.

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No. 193. FEWER ACCIDENTS AND WE ALL PROFIT.—The prevention of accidents is a most profitable undertaking. Its profits consist of two things which every manufacturer and workman is interested in, viz., the almighty dollar, human life and limb. Manufacturers are studying the matter of production very carefully. Nothing is to be wasted. In a packing house, not only the meat is used, but the marrow is extracted from the bones, and, finally, after being boiled to get all the juices out, the bones are ground up and sold for fertilizing. But if these same packers are not vitally interested in accident prevention they are not true economists. Accident prevention is one of the biggest dividend-papers, when properly undertaken and carried out. The United States Steel Corporation has saved millions of dollars since going into the accident prevention business and adopting the slogan, "Safety First." Every man is interested in

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saving money, but there is only one thing that he will not sell for money, and that is life, so, naturally, he is more interested in saving it. Life is the most valuable thing a man has. The countries which are successful in the European war will demand indemnity from the losers and, no doubt, will obtain it. But no amount of indemnity can pay for the thousands of slain men, women and children. Cannot the safety movement be likened to this? We pay a man when he is injured, or we pay his family if he is killed. But that will not do. We must prevent the accident. We must prevent the injury. We must prevent the death. How are we to do this, you ask. The answer is, go into the accident prevention business with all your heart, mind and soul. When you have become enthused, it is an easy matter to obtain the necessary plans and details of the work. The National Safety Council stands ready to assist you in every conceivable manner. In fact, there is not a safety man in this country who is not willing to do all he can to instruct you in this great movement. One of the pioneers of the safety movement, called the "Father of Safety," was never so happy as when telling someone about his business or sending pictures, rule books and other information to companies that were just becoming interested in the movement.

Nothing is done in a plant where safety is properly thought of before the element of danger is considered and proper steps taken to insure the safety movement, called the "Father those likely to be affected by the work. This is the proper spirit. The safety inspector alone is incapable of obtaining the best results. He must have the management and the workmen with him. The general superintendent must be vitally interested in the movement, the superintendents, the foreman, and last, but not least, the workmen themselves. The workmen are usually the ones who get hurt and they are the ones to prevent accidents. The foreman must watch the work, and the workmen must be constantly on the look-out. They must think before they act. They must know the safety rules and they must apply them when on the job. The safety inspector and the safety committees will, by frequent inspections, discover the dangerous conditions and practices and have them remedied. The safety bulletin boards will be changed every week, and new and fascinating material posted. Every man in the plant will be examined on the safety rules. New men will be given notice to prepare for the safety examination, and thus at once learn the rules and that the company desires them to do all within their power to prevent accidents. In this way accidents will be reduced to a minimum and we will all profit.

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No. 194. SAFETY WORK IN SMALL PLANTS.—The "Safety First" movement, as applied particularly to small industrial plants, has, I believe, been handicapped by the mental attitude of the men in regard to the movement. I do not know that this has been the case in all plants, but there has been a feeling among a great many of the employes that "Safety First" was, in a sense, a joke; they believed that it was unnecessary and nonsensical to have small cuts and wounds properly dressed; that it was a waste of time to properly care for and replace guards on machines; that it was proper to take a chance if one thought he could get away with it, rather than take the safe way if it involved loss of time; that the reporting of unsafe or unclean practices was none of their business, and that a man who has numbers of accidents is simply unlucky.

These, and many other things, you "Men On The Job" can find instances of in your own shops, particularly among the older employes, and I believe it is a mental attitude, due to wrong bringing up in the shop. We have tried to change this attitude by having noon hour talks on these subjects, each talk bearing on a different subject; and we have followed these talks by posting on bulletin boards all accidents which

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were in any way traceable to one of these various causes. Also, when an accident occurs, the accident, the causes, and the remedy, are discussed in detail by the safety committee of foremen, and a written notice is given the foreman of each department where a similar accident might occur, giving as far as possible the cause and the remedy, and a warning not to let a similar accident occur in his department.

Reports from workmen of unsafe conditions and unsafe practices are encouraged by giving such reports prompt attention, and they understand that they can get quick results by reporting to the safety inspector.

We try to give prominence to the idea that it is in a sense a disgrace to be injured through carelessness, and any workman who is injured more than once through his own carelessness is talked to and warned by the superintendent, and given to understand that we have no place in our employ for the man who is careless or who needlessly takes a chance. These efforts have resulted in a changed attitude towards the "Safety First" movement in this shop.

I believe in guarding dangerous machinery, as far as possible, but I also believe that a standard of inspection which require guards that are many times needless, does more to lower the "Safety First" movement in the estimation of employes than any other one thing. No one will dispute the fact that some machines, guarded in accordance with the law, cause the operator some extra labor and inconvenience, and if the operator cannot see where he is being kept from danger by that guard he is quite apt to feel that it is a needless imposition on him. I will gladly listen to the man who can point out to me dangerous places and operations, and show me how they can be eliminated or guarded, but first of all it must be shown that the danger really exists; and that is the point where I believe the present system of inspection is weak. Guards are ordered where there is no apparent danger, and other places that every employe in the shop knows are dangerous are passed by without a word. I believe that every inspector should have a thorough knowledge of the industry he is to inspect, and that he should be able to point out the dangers and advise remedies. When an inspector goes over our plant I want him to know more about the conditions and dangers for which he is inspecting than we do ourselves; he should be a specialist in his line and that requires long training. I believe I am safe in saying that we have all seen inspectors where this necessary training was lacking.

More practical knowledge, and a more intelligent administration of our factory laws would be a great help to the "Safety First" movement.

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No. 195. YOUR "SAFETY FIRST" CAMPAIGN.—While the safety organization is a very important factor in a campaign for accident prevention, it matters very little whether the organization consists of workmen's committees, a safety department or simply an inspector working with and through the foremen; for, after all, the organization is simply a means to an end. It is the campaign of education that gets results.

The campaign must be thought out carefully beforehand so that it may have a sound, practical basis. No set rules can be made that will fit all plants. The campaign must be adapted to the particular plant in which it is to be applied.

One of the most important features is for the executive department to show an enthusiastic and genuine interest in the campaign. This is absolutely necessary, for, unless those at the head of a concern are interested and pushing, the campaign will be handicapped seriously, and may fail altogether. Workmen should know that the management is earnest in its desire to prevent accidents and that it is the employes themselves who are to benefit by this movement.

No doubt some opposition will be made to the placing of guards on machines and the changing of old methods, but this is to be expected. You will find that most of these objections come from the "chance-takers" who have been doing things in the old way and have not yet been hurt. Diplomacy is required to convince these men that it is not a

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matter of personal preference, but a matter of safety of life and limb.

Oftentimes a man is found who persists in careless and foolhardy practices, placing not only himself but his fellow workers in danger. In many cases of this type the careless man is often cured by men who work with him. If this does not happen, and it is impossible for the safety department to win the man over, there is but one alternative—let him go.

To succeed in your campaign for the prevention of accidents, half-hearted or half-way measures have no place.

Men should be encouraged to make suggestions with reference to guarding of unsafe machines or stopping of unsafe practices. When a suggestion is made, if reasonable and practicable, adopt it. If not reasonable or practicable, explain to the man who made it why his plan could not be used. He will then know that his suggestion received attention. For the collecting of these suggestions there should be at least one suggestion box, and it is advisable to have more than one.

Bulletin boards should be placed in each department of the factory, and bulletins, photographs, newspaper clippings, health hints, etc., should be posted thereon. However, the most effective way of getting safety and health bulletins before workmen is to mail them to their homes, say on Friday afternoon, so that they will reach their houses Saturday morning. In this way the bulletin also reaches the man's family, who has more influence than any other element in his life.

Illustrated bulletins with as little printed matter as possible (just enough to tell the story) are very important factors in education for safety. Safety mottoes on pay envelopes or attached to pay checks are well worth while.

A small attractive button, not necessarily expensive, has been found to help the men to remember that "Safety First" is the best way to do their work.

No matter how successful the campaign is, accidents are bound to happen. Therefore, it is well to be prepared for them, and to have a first class dispensary centrally located in your shop. This should be in charge of some one who has been fully instructed in the giving of first aid, by a physician who should have direct supervision over the dispensary. "Safety First" applies to the proper dressing of an injury as well as to the guarding of plant and men.

It is a mistake to issue a large number of rules at the very start of your campaign. These will gradually work out as the campaign proceeds. Many of these will be among the suggestions made by the workmen, or derived therefrom.

A complete record should be kept of every accident, no matter how small and insignificant it may seem. These reports should be classified and a statistical record or graphic chart should be made up showing the departments having the fewest accidents, the class of work causing the most, and the location of accidents with reference to the body.

When serious accidents do occur, the first opening is made for teaching a lesson (not to the injured alone, but to others in the plant), and the following quotation from the bulletin of a company we call to mind, *"We do not want to have the same kind of an accident twice."* That is a very good plan to adopt.

PRIZES FOR SEPTEMBER ARTICLES

First Prize. No. 187. *Robert H. Fulton, Jr., The United States Aluminum Company, New Kensington, Pa.*

Second Prize. No. 190. *E. H. Hart, Inspector, Charles L. Dexter & Co., General Agents, Ocean Accident & Guarantee Corporation, Limited, Dallas, Tex.*

Honorable Mention. A tie. Nos. 188 *and* 189. *John W. Kamper, Safety Inspector, American Locomotive Company, Schenectady, N. Y., and Joseph Spitz, Newark, N. J.*

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COMMENTS BY MEMBERS OF THE COMMITTEE

My choice is No. 189. The writer states that for years he has been an experienced factory inspector and he relates personal experiences that have come under his notice. Surely a man of this type is able to make more practical suggestions than can one who is working along simply theoretical lines. There is no question but what if rightly understood "All Be Careful" and "Safety First" suggestions would be adopted by right thinking employers and employes, first, from a humanitarian standpoint and, second, for the economic value that such a condition would bring. A little diplomacy engendered, and a careful presentation of the necessary devices and safeguards, would readily bring any worker to the viewpoint of the person who is speaking solely for his good.

My choice is No. 190. The person writing that article showed that he is conversant with the obstacles met each day, in the course of the average inspector's travels. He also shows diplomacy in agreeing with the person with whom he is talking. I have found that when an inspector recognizes the opinion of those in authority, he can do valuable safety work.

My vote goes to No. 190. I like the way he hands it to himself as the "Inspector on the Job," as it shows that a man who blows his own horn will generally do something, or at least attempt something; also that he sees the importance of small things, which are too often lost sight of by most inspectors. "Still water runs deep" does not appeal to me. The man who really knows is not afraid to say so.

I vote for No. 188 because its general tone seems to fit the greatest need. Industrial concerns are continually adopting safety measures, and the campaign must be very carefully conducted if it is to succeed. All the articles in the September number emphasize the importance of the personal appeal, but No. 188 goes farther and gives some helpful suggestions. Safety work in this plant is not exactly a new idea, but the article referred to gave the writer some very good ideas for future use.

I consider No. 187 the best, because it shows that he knows how to reach all the men, both workmen and foremen, and I am convinced that this method is certainly the right one.

I cast my vote for No. 189. The writer of that article not only states how important it is to properly educate the employes themselves in accident prevention work, but he also shows how the interest and co-operation of the workmen may be secured. In conducting a safety campaign it should be borne in mind that the interest of some of the men can be secured in one way, while that of other men must be secured in another manner. Some tend to be more careful and thoughtful because of their love for those dependent upon them; others are brought in line in the hopes of securing one of the prizes.

I vote for No. 187. Personal appeal to the men is the thing that counts. Some plants are so situated that safety committees are impractical, owing to the foreign element. One can always appeal, however, to the workmen through the foremen and an appeal once heeded without the use of a prize or bribe is more lasting.

My vote goes to No. 190 for the reason that the writer gives practical experiences and shows something accomplished in the good work of protecting The Man On The Job.

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My vote is cast for No. 190. I agree with all writers of articles in the September contest in most things they say, but find more information as well as statements of facts, to which consideration should be given, in No. 190, than in any of the others. It is true the obstinate man is hard to deal with, but there are ways, and the writer points out some of them. The published cut of a guard for a cut-off saw furnishes me with an idea I was looking for. Unfortunately the statement in regard to lack of effort and appreciation of responsibility on the part of superintendents and foremen, especially foremen directly in charge, is, as the writer of No. 190 says, responsible for many preventable accidents.

I vote for No. 187, for the reason that its writer shows a correct appreciation of the basic principle of industrial safety, which is the education of the individual in care and caution. In the long run, mechanical safeguards are useless, unless the determination exists to respect them, and this determination can be extended by education to cover the avoidance of all *known* dangers. Nothing will prevent a reckless and foolhardy fellow from taking a risk, except having his wrong frame of mind eradicated by education. "As a man thinketh, so he is." If men have thoroughly ground into them the precepts of safety until they automatically and subconsciously *think* safety, they *will* be safe. No. 187 elaborates this idea and shows how to make it practical for everyday use.

In my opinion No. 187 is the best. It has been proven that the fundamental accident preventer is the individual workman. It is true that the greatest single aid (which should be attempted first and kept up all the time) is the personal appeal for safety from the general superintendent to the very lowest workman.

Article No. 187 is my choice for first prize. This article appeals to me because it strikes the keynote of "Safety First" when it states "that a personal appeal for safety to the men gains the desired end"—calling attention not only to the consequences of an accident to themselves and their families, but also to their fellow employes. A greater number of accidents can be avoided by getting the good will of the men than by guarding machinery.

After carefully reading the different articles I found it difficult to decide which was the best. Finally my choice rested upon No. 187. If a personal appeal could be made directly to the individual man, the number of accidents would take a decided drop.

ACCIDENT REDUCTION

The Corn Products Refining Company's accident reduction experience throughout its seven plants:

Days lost, January to June, 1914, 3,164; January to June, 1915, 1,996. Days saved during first six months of 1915, 1,168. Percentage of days saved, 36.91.

Analysis of "Who and What Was At Fault" (accidents of January to June, 1915):

	Per Cent
Carelessness of injured	71
Miscellaneous	24
Carelessness of others	3
Lack of mechanical guards	2
	100

Analysis of Time Lost (accidents of January to June, 1915):

	Per Cent
No time lost	81
1 to 3 days lost	7
4 to 7 days lost	4
8 to 14 days lost	7
Over 15 days lost	1
	100

No deaths.

Only since the beginning of 1915 has organized safety work in all its branches been systematically carried on at the plants of the Corn Products Refining Company. Hence the results already achieved are suggestive, and indicate the humanitarian results of accident prevention activities.

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THE FIGHT AGAINST FIRE

To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 75 FIRE DANGERS IN THE HOMES.—Prosperity and depressions seem to run in periods of 5 years in the Southern States. During the periods of prosperity, fires can be traced to carelessness more than to any other cause. During the periods of prosperity they can be traced to moral hazard more than to any other cause.

In dealing with fire dangers in the homes the periods of depression will give the greatest loss ratio, particularly with homes that are mortgaged and especially when the homes are mortgaged to a local bank, local corporation of any nature or to an individual; for in many cases the homes are bought or built during the periods of prosperity, largely with borrowed money, and when the periods of depression come around, the home is still in debt. Default has been made in payments, interest, perhaps, has not been paid—the owner loses his position (nothing left but his home). His past savings are all in the home, with more to pay which cannot be done. The mortgagee also may find it difficult to meet his own obligations. Pressure is put on the original owner with only one of two alternatives, either to liquidate to the insurance companies, pay off the mortgage, have the lot left clear of debt with, perhaps, some surplus left to him, or to let the entire property be foreclosed and sold, with a very slim chance that it will bring enough to pay off the remaining debt and leave anything for the original owner. The final conclusion is a fire and a quick settlement with the insurance companies.

The fire insurance companies would serve their interests well by having all mortgaged property carefully looked into on each renewal so as to determine the exact status before continuing such risks.

Wooden shingle roofs constitute the next greatest hazard to the home, for they cover both periods of prosperity and depression, each year coming closer to the time when they may cause a fire, with a heavy damage or a complete loss.

After the roof is put on no attention is given to it until it becomes leaky, which, perhaps, is not longer than 8 or 10 years, but in the meantime, within 5 years, it becomes so weatherbeaten that it leaves a fine fiber that is just as ignitible as lint cotton. It is known that all flues or chimneys burn out from coal soot or wood carbon at least three times during the fall and winter, throwing thousands of sparks on the roof. One can readily account for the many roof fires.

The insurance companies would serve their interest to a greater extent than ever if they would either prohibit shingle roof dwellings after they are 10 years old or make a greater difference in the rates between wooden shingle roof dwellings and those covered with non-burnable roofs.

If these two dangerous elements—that is the failure to meet mortgage interest and shingle roofs—were controlled, or more carefully handled, the loss ratio on the class would be just as attractive as more desirable classes instead of being a constant menace to the surplus account.

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No. 76 "SAFETY FIRST" IN FIRE PREVENTION.—Having read the ideas of many of the readers of SAFETY ENGINEERING with reference to fire prevention and "Safety First," they all seem to me to drift on one and the same plane—always protecting those that are "awake" and never giving a thought to those that are asleep. Therefore, I would like to make a few suggestion with reference to the construction of buildings in districts outside the fire limits for the protection of the "sleeper," in which our lawmakers could take a hand.

1. Encourage the constructing of buildings of incombustible material, instead of frame structures.

2. Have such buildings detached.

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3. Tax owners per family.

Buildings outside the fire limits are permitted to be built of wood, so-called frame structures, which in time become so congested, that they are dangerous to the persons residing or sleeping within them. Such a hazard in time will have to be done away with. So why not start a movement to encourage the owners in the constructing of semi-fireproof buildings?

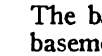
Constructing a building of brick, stone, concrete, terra-cotta, etc., costs more, in the first place, than a frame building. Then the tax on such buildings is according to the valuation, making expenses higher all around, thus discouraging the building of semi-fireproof structures.

An ordinance placing the semi-fireproof structure on equal terms with the frame structure with reference to taxation, would greatly encourage building with incombustible material.

The Ordinance: Tax ground separately from the building, i. e., tax ground per foot. Tax the building per family, increasing the percentage for each family over that would discourage the building of large flats.

The insurance companies have always rated frame structures as a hazard. So it is time we started a "Safety First" movement. There is much vacant space, therefore we could have all such buildings detached. That would prevent the spread of fire and lessen the danger to life from the spread of such fires.

Passing such an ordinance and building structures of that class would mean "Safety First," also "Fire Prevention." It would also beautify the city, lower insurance rates, and improve sanitary conditions.



No. 77 ADVANTAGES OF THE AUTOMATIC FIRE ALARM SYSTEMS IN BUILDINGS.—In the history of almost every serious fire there were moments when a bucket of water, properly applied, would have prevented thousands of dollars of loss. As a rule it is many minutes before a fire gets such headway that a little effort cannot control it. A few moments of forgetfulness or drowsiness or inattention on the part of a watchman and the mischief is done.

The automatic fire alarm system takes a prominent part in fire prevention work. It is not subject to any of the frailties of mankind. It never leaves its post. It is never weary or distracted. At any moment of the day or night and in all kinds of weather it is alert to give warning of even the most insidious fire.

Automatic fire alarms are of two general types, the open circuit and closed circuit systems. All systems should be arranged so as to give, automatically, distinctive trouble signals when any part of the wiring of the system is grounded or broken, or when the proper transmission of a fire signal is in any way impaired.

In the closed circuit type, electricity is utilized to prevent the operation of the recording device by flowing continuously through the system. The action of the thermostat under sufficient heat causes the circuit to be broken, thereby interrupting the control of the electric current over the signaling mechanism, thus allowing the signal to be given.

In the open circuit type the action of the thermostat closes the circuit, thus causing the electrical energy to operate the alarm.

Thermostats are spaced the same as sprinkler heads and are of two general types, those operating by solder release, and those operating by expansion. The most common is the solder release type.

This is constructed of brass mounted on a porcelain base, and consists of connecting points for the wires in two small links of easily fusible metal, enclosed within and protected by a shell of sheet brass. The transmitting box is placed in some convenient place on the first floor. The batteries are set up in the cellar or basement. Starting from the transmitting box, wires are run from the batteries to each thermostat on each floor. Each thermostat is thus connected with the box through a constantly closed circuit.

Expansion thermostats depend upon the expansion of either liquids or metals under heat to cause same to operate. Among the liquids used are mercury and ether, which, expanding within metal tubes, cause the circuit to be completed. In thermostats depending upon the ex-

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pansion of metal springs, the well-known unequal expansion of two dissimilar metals is utilized in order to magnify the amount of motion.

Thermostats operate automatically by means of fusible links or as above described. The fusible links melt whenever the temperature rises above a certain point, commonly 160 degrees F. The fusing of the thermostat opens the circuit and releases the mechanism of the transmitting box. The box, thus set in motion, transmits the building number, and indicates through an annunciator the exact location of the fire. Beside the annunciator, there is a hand signal box, which is placed in a prominent position, so that in case a fire is seen to break out the box can be pulled the same as a street box.

The entire equipment is always under test, and should any accident occur to the system it is immediately known at the central office where a corps of workmen are always on hand to respond to such emergencies.

There are several other kinds of thermostats but as they have not received the full approval of the insurance companies and have not been used sufficiently to warrant approval they will not be described.

The merit and value of automatic fire alarm devices can hardly be overestimated. While they are used in conjunction with sprinklers they are also of great value where there is no sprinkler system. All office and mercantile buildings, department stores, schoolhouses and all buildings where the contents are of such a nature that a fire would spread rapidly if not discovered immediately should be equipped with thermostats. There are numbers of mercantile buildings in New York City with dry sprinklers in cellars that have only one source of supply, namely, the outside siamese, also perforated pipes with only the same means of supply. A fire occurring in these cellars is not noticed until it has assumed such proportions that frequently the hangers and pipes are destroyed before the arrival of the fire department. This is where thermostats are absolutely necessary.

It is seldom that a fire occurs in a schoolroom, the records showing that most school fires occur in basements and out-of-the-way places, where the automatic alarm would be useful. Take the warehouses along the river front. They are locked from sundown until morning. A fire occurring in this class of building is not noticed until it bursts through the roof or windows.

While the use of the automatic alarm does away with the services of a watchman this is not advocated, as the watchman, if he does not see the fire himself and is warned by the automatic alarm, may be able to extinguish the fire with such auxiliary fire appliances as all such buildings contain.

So important is this system of fire protection regarded by the insurance companies that they allow a reduction of at least 10 per cent on buildings so equipped.

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No. 78 OIL-BURNING LOCOMOTIVES.—This article may not be very interesting to the majority of readers, but it is a subject which needs serious thought and constant care by those who are handling or firing oil burning locomotives.

It is queer how men who are fearless throw themselves into the path of danger, little thinking of the results should something happen. Quite a number of the railroads of this country are using crude petroleum for firing their locomotives on various divisions. It has been found to be applicable to most any kind of service, switching, freight, passenger, etc., and the danger is just as great in the smallest oil-burning engine as in the monster mallet.

The fuel oil is carried in a tank or tanks on the engine tender, the oil being fed down by gravity, usually, to the burner in the fire box, most oil burning locomotives having the burner located in the front of the fire box.

What I consider a danger in oil-burning locomotives is the starting of a fire in the engine, and also the care of the engine at the terminal. This danger is great either with an engine that is cold or with an engine whose fire has recently been extinguished. For an example, a switch engine that has just been taken

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off duty, say one-half hour, is put away in the roundhouse, the fire put out, etc. The roundhouse foreman is notified by the yard that an extra switch engine is needed. The fire watchman is then notified to get this extra engine ready for service. After the engine has stood this length of time, considerable condensation has gathered in the atomizer pipe. (The atomizer being a steam jet which sprays the oil at the burner.) It is possible that during this time water has also settled around the fuel oil valve in the tank. One might readily see what water will do to an oil fire that is trying to be started, especially when it is discharged through the burner opening with the oil spray. Naturally a person will look in the fire box to see if the oil is burning or if the piece of waste or rag which has been thrown into the fire box to start the fire has gone out.

To carefully start an oil fire in an engine under steam, the watchman should first drain the fuel oil tank of all water accumulation which may have settled in the tank. Next see that the tank fuel oil valve is closed, see that the firing valve is closed, properly adjust the dampers according to the size of fire intended. Then open the atomizer valve wide enough to blow out all steam condensation, closing the valve after doing so. Next light a piece of waste or a good substitute and drop in the fire box about 2 feet in front of the door and close the fire door tightly. Next open the atomizer easily, cracking the firing valve slightly, so that the oil will not rush out suddenly. After the oil has ignited, open the blower valve a little to give the fire a draft. Regulate the fire as evenly as possible to avoid smoke and dropping fire. Remember never to look into a fire door directly after lighting a fire, because a pocket of water might shut off the oil flow for an instant; then the oil which suddenly follows will again ignite with an explosion which will probably shoot out the front damper in the door and burn you severely if you happen to be in front of the fire door.

Fire watchmen should examine pits or ground beneath all engines to make sure that no oil has accumulated there which might start a conflagration should burning oil drop from the fire box when a fire is started. I have seen whole engines enveloped in flame from just such carelessness—runningboards burned off and driving boxes damaged by the heat from the flames. The engines mentioned did not have sufficient steam with which to move themselves, nor could they be gotten to with another engine, consequently they stood in the flames until they were smothered out with sand.

All should remember that fuel oil is very volatile and is a hard thing to fight when it once gets a good start. Oil gas when inclosed is also very explosive.

I have an instance in mind when a fire watchman was called upon to get an engine ready on a rather short notice. The engine had been in for repairs for several weeks, and the oil tank had been drained of nearly all oil during its stay in the roundhouse. The watchman, ignorant of the danger, took a lighted torch with which to examine the interior of the fuel oil tank. A muffled explosion was heard and a few minutes later the watchman was found in a dying condition under the driving wheel of the engine in the next stall.

At another time a fire watchman had a hurry up job on a special. He recklessly looked at a fire that he had just lighted, and a pocket of water appeared at the burner, which momentarily extinguished the fire just as he looked in the door to see how it was burning. Before he could withdraw himself the oil again ignited, exploding, throwing open the fire door that he had not fastened, burning him severely about the head and face, disabling him three weeks.

On another occasion a fireman on a heavy night through freight run wished to inform himself of the oil level in the tank, to ascertain whether it would be necessary to take oil at the next oiling station. He raised the measuring rod and placed a torch against it. Just as he did this the gas in the oil tank exploded, throwing fire 30 feet in the air, badly damaging the oil tank and slightly injuring the fireman. He miracuously escaped serious if not fatal injury.

You cannot be too careful. We must not become so accustomed to our work that indifference leads us astray. Play-

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ing safe is efficiency; let every one play safe. When you are in a hurry don't say there is not time for safety now. That is just when you should practice it. Remember that old saying "Haste makes waste." It looms up only too true, time and time again. In order to cut down nearly 90 per cent of our industrial accidents, *let every one be an inspector of his own safety.*

PRIZES FOR SEPTEMBER ARTICLES

First Prize. No. 73. C. W. McKeehen, Secretary State Fire Marshal, Oklahoma City, Okla.

Second Prize. No. 72. G. W. Jager, Mechanical Engineer, Irvington, N. J.

Honorable Mention. No. 74. Rudolph H. Meinhold, Fireman, First Grade, Hook & Ladder Company No. 143, Richmond Hill, L. I., N. Y.

Another meritorious article was contributed by Dr. H. Colin Campbell, Assistant Engineer, Universal Portland Cement Company, Chicago, Ill.

COMMENTS BY MEMBERS OF THE COMMITTEE

I vote for No. 73 for the reason that the suggestions are feasible and sound. By beginning with the child, I believe a most important move is made in The Fight Against Fire for the future years. I heartily approve the education of the child in matters covering fire prevention.

I vote for No. 72, because the writer gives actual happenings at fires in industrial plants in small towns because the men are not drilled to extinguish fires. In case of a local department responding, the fire may gain headway if the two parties do not agree.

I vote for No. 73. In my opinion, that article is the most adaptable and practical. Great benefits would be derived if fire prevention was made one of the studies in public schools.

I select No. 72 on the ground of practicability. The scheme is apparently workable to a considerable extent and is likely to be productive of good results. The article possesses merit, also, in that it advances a proposition and a method for carrying out the idea. I pass No. 74 with regret. It is well written, and the object sought of much importance, but it is not a new subject treated in a new way, nor does the article suggest any means of overcoming the apparently unsurmountable obstacles. Complete inspection would generally require more than the entire time of the entire fire department. That is true of No. 73. A good article, a good (but not new) subject, but no clue as to how to educate children under four years of age in fire protection, and from two to four is the danger period. If we could educate the parents, it would help—but that is another story.

I vote for No. 73. In our public schools we are teaching hygiene, cooking, sewing, etc., all of which have to do with the welfare of the human being. Why, then is it not just as important to teach the principles and practice of fire prevention? In my opinion, the author has struck at the very heart of the matter.

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CELLULOID DANGERS

Wearing apparel made of celluloid is dangerous. The safety department of the United Gas Improvement Company illustrates, in this picture, a warning against the use of celluloid eye shades. The man set fire to the shade while lighting his pipe. Quick action enabled him to get the shade off before his eyes or face were burned. The burned portion is indicated at about the center of the shade. What happens when flame comes in contact with ordinary celluloid is shown in the upper left corner of the picture. Celluloid collars are dangerous in the same way as celluloid eye shades and should also be avoided.

UNSAFE ELECTRIC WIRES

Some of the electric wires in one of the stories of a warehouse of the Northern Furniture Company, Sheboygan, Wis.; that had been down in a few places, were nailed to the joists. In other places they were tied up with strings. That did not seem to be safe, and a workman so reported to the safety committee of the Northern Furniture Company, Sheboygan, Wis. The committee reported that it was a temporary arrangement, and that it had been attended to. The report of the workman was appreciated, nevertheless.

ACCIDENTS CLASSIFIED

Factory accidents are generally of two kinds, those due to carelessness and those due to other causes. Of the whole number, the safety department of the Ford automobile plant declares that more than three-fourths are due to carelessness on the part of some member of the force.

Cleaning running machinery, getting cut on steel shavings, failure to wear goggles and getting hurt in the eyes, starting the machines without having guards in place, failure to heed warning signs, stepping on upturned nails, lifting too heavy loads, not heeding the monorail alarm balls—these are just a few of the ways by which careless men are injured every day. It is this sort of neglect that keeps the doctors busy, and costs the workmen a great deal of money in lost time.

ENCOURAGES EMPLOYES TO THINK

The Youngstown Sheet and Tube Company maintains a committee to receive and consider recommendations or suggestions from employes on any subject pertaining to production, processes, practices, machinery, safety, welfare and sanitation, or other matters having to do with production or working conditions in the various plants. An award of $25 is made for the best suggestion received during the month, $15 for the second best, $10 for the third best and $5 for each as many honorable mentioned suggestions as the committee deems proper.

People are so accustomed to riding in elevators that they sometimes fail to realize the dangers. Safety engineers have been advocating the use of the car gate for some time.—*J. D. Rice.*

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SOME FIRES IN HOTELS IN 1915

SOME particulars of 31 recent fires in hotels, taken from special reports to SAFETY ENGINEERING, are given in the compilation herewith.

The 31 fires burned for an aggregate of more than 141 hours, an average per fire of about 4½ hours. The 31 fires, expressed as a continuous conflagration, lasted nearly 6 days.

No one can look over the details of these reports without noticing, and lamenting, the generally inflammable construction indicated. Wood, wood, wood! In walls, floors and roofs! Common enough to account for the serious fire hazard and menace to life, generally recognized as existing in American hotels, especially in the smaller places. "Fire was favored by inflammable material." That is the substance of many comments on these hotel fires by the chiefs of local fire departments.

As a whole, the record affords a good subject for discussion by contributors to SAFETY ENGINEERING in "The Fight Against Fire" deparement:

April 2, 1915. Pass Christian, Miss. Mangolia Hotel. One three-story building destroyed. Walls, wood. Floors, wood. Roofs, slate. Cause, unknown. Fire started third floor. Discovered by passerby about 11:30 p. m. Alarm by telephone. Duration, hour and a quarter. Stopped at dining room in hotel. Persons in building, 27. Injured, none. Means of escape, ordinary fire escapes, doors and windows, value of building and contents, $35,000. Property loss, $20,000.

April 2, 1915. Chippewa Falls, Wis. Royal Hotel, Bay street. One two-story building partly destroyed. Walls, brick veneered. Floors, wood and cement. Roofs, wooden shingles and iron. Cause, electric wire. Fire started in attic. Discovered by smoke pouring from roof about 8:15 a. m. Alarm was given by a passerby. Duration, four hours. Stopped at about where it started. Persons in building, 20. Injured, none. Means of escape, stairways. Value of building and contents, $8,000. Property loss, $4,000.

April 4, 1915. Marshallville, Ga. Elberta Hotel. Main street. One two-story building destroyed. Walls, wooden and plaster. Floors, wooden. Roofs, galvanized iron. Cause, unknown. Fire started in attic over kitchen. Discovered by smoke about 3:15 p. m. Alarm, telephone. Duration, two hours. Stopped after consuming building. Firemen handicapped by repairs being made on water mains. Persons in building, 10. Injured, none. Means of escape, stairways. Value of building and contents, $7,000. Property loss, $5,000 to $7,000.

April 4, 1915. Harrisonburg, Va. North Main street. Hotel. One three-story building partially destroyed. Walls, brick. Floors, wood. Roofs, slate and metal. Cause, defective wiring. Fire started in roof. Discovered by passerby about 7:35 a. m. Alarm, regular electric system. Duration, two hours. Stopped at roof. Fire was favored by poor construction. Private fire apparatus, hotel hose. Persons in building, 50. Injured, none. Means of escape, fire escape and stairs. Value of building and contents, $113,000. Property loss, $15,000.

April 4, 1915. Corning, Ark. Model Hotel and other buildings. First street. Hotel, pool hall, etc. Three buildings destroyed, one-story and two-stories. Walls, brick and wood. Floors, wood. Roofs, tin and asbestos. Fire started in hotel, about 1 or 2 a. m. Duration, two or three hours. Stopped at pool hall. No fire department.

April 4, 1915. West Sutton, Mass. West Sutton Hotel. Main street. One building destroyed, two and one-half stories. Walls, brick and wood. Floors, wood. Roofs, shingles. Cause, unknown. Fire discovered by cracking and roaring of flames about 1:30 a. m. Duration, two and a half hours. Stopped in building where started. Fire was retarded by brick construction. Persons in building, three. Injured, none. Means of escape, doors. Value of building and contents, $5,000.

April 7, 1915. Long Branch, N. J. Monmouth Park Hotel. Oceanport avenue. One building destroyed, three stories. Walls, lath and plaster. Floors, wood. Roofs, shingles. Cause, unknown. Fire started in paint room. Discovered by caretaker about 6.15 a. m. Alarm by messenger. Duration, fourteen hours. Fire confined to building. Fire was favored by wood construction and hall running through building. Firemen handicapped by size of building. Persons in building, four. Injured, none. Value of building and contents, $75,000. Property loss, total.

April 14, 1915. Eudora, Ark. Travelers' Hotel and others. Hostelry and general merchandise. Four buildings. One and two stories. Walls, frame. Floors, wood. Roofs, wooden shingles and metal. Cause, unknown. Fire started two buildings from hotel. Discovered by occupants about midnight. Alarm, verbal—no fire department. Duration, two hours. Stopped after burning four buildings. Fire was favored by flimsy construction. Private fire apparatus, buckets and extinguishers. Persons in buildings, eight. Injured, none. Means of escape, only doors. Value of building and contents, $7,000. Property loss, $4,000.

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April 17, 1915. Minneapolis, Minn. Alton Hotel. 806 Nicolette street. Stationery, jewelry and hotel. Parts of two buildings destroyed, two and five stories. Walls, brick. Floors, ordinary wood. Roofs, tar and gravel. Cause, unknown. Fire started on first floor in stationery store. Discovered by persons in hotel about 2:59 a. m. Alarm, by telephone. Duration, 1 hour and 40 minutes. Stopped at third floor. Fire was favored by open hall and stairways, with no fireproof doors separating buildings. Private fire apparatus, three chemical hand extinguishers. Persons in building, 50 to 60. Injured, none. Means of escape, two stairways and one fire escape. Value of building and contents, $154,000. Property loss, $19,225.

April 18, 1915. Scranton, Pa. Carlton Hotel and others. 617-19 Lackawanna avenue. One building partly destroyed, four stories. Walls, brick. Floors, wood. Roofs, tarred. Cause, indefinite. Fire started in rear of cellar. Discovered by citizen about 2:52 a. m. City alarm. Duration, one hour and forty-one minutes. Stopped at third story. Fire was retarded by brick construction. Persons in building, eight. Injured, two firemen. Means of escape, ladders. Value of building and contents, $40,000.

April 19, 1915. Bowbells, N. D. Burk Hotel, restaurant. Two-story building. Walls, wood, covered with sheet iron. Floors, wood. Roofs, tar paper and gravel. Cause, not known. Discovered by hotel clerk about 3 a. m. Alarm, fire bell. Duration, one hour and a half. Stopped when building was consumed. Fire was retarded by sheet iron covering wood. Injured, none. Value of building and contents, $5,550. Property loss, total.

April 19, 1915. Grand Rapids, Mich. Pantlind Hotel, 208 Lyon street. Three-story kitchen for hotel cooking. Walls, brick. Floors, wood. Roofs, gravel. Cause, stovepipe near woodwork. Discovered by employe about 6:17 p. m. Alarm, street box. Duration, half hour. Stopped near where it started. Fire was favored by easy burning material. Persons in building, 75. Injured, none. Means of escape, stairways only. Value of building and contents, $40,000. Property loss, $1,000.

April 20, 1915. Sturgis, Mich. Sturgis Hotel Building. Chicago and N. Nottawa Sts. Stores and shops. Two buildings destroyed; one and two stories. Walls, siding and plaster. Floors, wood. Roofs, shingles. Cause, unknown. Fire started in rear of building. Discovered by neighbors about 2 a. m. Alarm by telephone. Duration, two days. Stopped in second building. Fire was favored by buildings being old. Persons in building, several. Injured, none. Means of escape, stairways. Value of building and contents, $5,000. Property loss, $5,000.

April 21, 1915. Decatur, Ill. Decatur and Arcade Hotels. 137 North Main St. Two five and seven-story buildings destroyed. Walls, brick. Floors, wood. Roofs, tin and gravel. Cause, unknown. Fire started in basement. Discovered by engineer about 1:55 a. m. Alarm, engineer ran to fire house. Duration, five hours. Stopped after two buildings had been burned. Firemen handicapped by shortage of men and apparatus. Private fire apparatus consisted of standpipe and hose in building. Killed, two. Means of escape, elevators and ropes in rooms. Value of building and contents, $155,600. Property loss, $124,000.

May 1, 1915. Amarillo, Texas. Santa Fe Hotel, 1000 Grant St. Two-story building. Walls, frame. Floors, wood. Roofs, shingles. Fire started in several places simultaneously. Cause, unknown. Discovered by merchant across the street about 9:15 p. m. Alarm by telephone. Duration, 1½ hours. Stopped in building where it started. Fire was aided by flimsy construction. Injured, none. Means of escape, only doors. Value of building and contents, $8,000. Property loss, $8,000.

May 10, 1915. Russellville, Ala. Hotel building. Jackson and Lawrence streets. Hotel, dry goods, hardware. Two stories and basement. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in dry-goods store. Discovered by a passerby about midnight. Alarm, pistol shots. Duration, 1½ hours. Stopped at wall of adjoining building. Injured, none. Value of building and contents, $45,000. Property loss, $40,000.

June 6, 1915. Thomaston, Me. Hotel Knox and others. Main street. Hotel, drugs, hardware, clothing, jewelry, etc. Six buildings destroyed. Two and three stories. Walls, wood and brick. Floors, wood. Roofs, slate, shingles and roofing. Cause, unknown. Fire started in livery stable. Discovered by residents nearby about 1:15 p. m. Alarm, telephone. Duration, 12 to 15 hours. Stopped after consuming buildings named. Fire was favored by flimsy construction. Firemen handicapped by lack of water. Persons in building, 30. Injured, none. Means of escape, doors. Value of building and contents, $100,000. Property loss, $60,000.

June 6, 1915. La Porte, Texas. Business block. Third and Main streets. Hotel, post-office, stores, dwellings. Sixteen buildings destroyed. One, two and three stories. Walls, one brick, balance frame. Floors, wood. Roofs, shingles, corrugated iron, "Texaco." Cause, gasoline explosion. Fire started in garage. Discovered by occupants about 4 p. m. Alarm, verbal. Duration, 2 hours. Stopped at jewelry store, Main street. Fire was favored by drouth and high wind. Firemen handicapped by lack of water. Means of escape, two stairways. Value of building and contents, $60,000. Property loss, $40,000.

June 6, 1915. Transcona, Man. Hotel, store, boarding house. Regent street. Four buildings destroyed. Two and three stories. Wall, 3 frame, 1 brick. Floors, maple and ash. Roofs, flat. Cause, lighted cigarette. Fire

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started in rubbish in clothing store. Discovered by policeman about 1:40 a. m. Alarm verbal by policeman. Duration, six hours. Stopped at a vacant store. Fire was favored by frame buildings and brick veneered. Firemen handicapped by lack of water caused by broken main. Persons in building, 63. Injured, none. Means of escape, 3 fire escapes. Value of building and contents, $135,000. Property loss, $70,000.

June 15, 1915. Seatle, Wash. Hotel. 2818 Jackson street. Unoccupied, except by owner. One building partially destroyed, another slightly damaged. Hotel, 2 stories; others, 3 stories. Walls, frame. Floors, wood. Roofs, wood shingles on hotel; composition on others. Cause, incendiary suspected. Fire started in hotel closet, second story. Discovered by smoke issuing from window about 3:12 p. m. Alarm, fire alarm telegraph. Duration, 30 minutes. Stopped at spot where department found it. Fire was favored by being old frame building. Persons in building, none. Means of escape, front and rear stairs. Value of building and contents, $9,500. Property loss, $2,000.

June 23, 1915. Detroit, Minn. Minnesota Hotel. Washington avenue. One 4-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, gasoline explosion. Fire started in laundry. Discovered by the help about 6 p. m. Alarm, whistle. Duration, 1½ hours. Stopped on the premises. Firemen handicapped by shortage of water. Private fire apparatus, 2 hose carts and ladder truck. Persons in building, only the help. Injured, none. Means of escape, iron fire escapes. Value of building and contents, $20,000. Property loss, $12,000.

July 8, 1915. Ocean View, Pa. Kimball Hotel, Richmond Hotel and others. Virginia avenue. Hotels and cottages. Two two-story buildings destroyed, one partially. Walls, wood. Floors, wood. Roofs, tin and shingles. Cause, unknown. Fire started in Yale cottage. Discovered by occupants of adjoining dwelling about 2 a. m. Alarm by ringing bell. Duration, three and one-half hours. Stopped at cottage. Fire was favored by dry and inflammable material. Firemen handicapped by lack of plugs and pressure. Persons in building in one cottage, 2. Injured, none. Means of escape, doors and windows. Value of building and contents, $3,000. Property loss, $2,500.

July 20, 1915. Clyde, N. D. William Gardner Hotel. Main street. Two buildings destroyed. Hotel two stories, blacksmith shop one story. Walls of hotel, frame with galvanized sheathing outside. Floors, wooden. Roofs, shingle. Fire started in kitchen. Discovered by smoke entering bedroom of proprietor about 3 a. m. Duration, about three hours. Fire was retarded by galvanized sheathing. Private fire apparatus hand extinguishers. Persons in building, seven. Means of escape, stairway. Value of building and contents, $2,000. Property loss, trifling.

July 26, 1915. Dunn, N. C. Hotel McLeod and others. East Railroad street. One 2-story building destroyed. Walls, wood and plaster. Floors, wood. Roofs, shingle. Cause, unknown. Fire started upstairs, front room. Discovered by railroad man about 1:15 a. m. Alarm, by gong. Duration, about one hour. Stopped at building where started. Fire was favored by wooden building only 3 feet from it. Persons in building, three. Means of escape, stairs and doors only. Property loss, $6,000.

July 28, 1915. Schenectady, N. Y. Mohawk Theatre building. 6 College street. Hotel, recently vacated. Four-story building, two top stories gutted. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in third story. Discovered by passerby about 1:43 a. m. Alarm, by box. Duration, one hour. Stopped at third story. Private fire apparatus, extinguishers. Means of escape, iron fire escapes on both sides.

July 29, 1915. Waterloo, N. Y. Lux Hotel. One 3-story building partially destroyed. Walls, wood. Floors, wood. Roofs, rubber. Cause, unknown. Fire started in kitchen. Discovered by citizen about 3 a. m. Alarm, by telephone. Duration, two hours. Stopped at second story. Fire was favored by wood construction. Private fire apparatus hand extinguishers. Persons in building, about 20. Killed, one. Means of escape, fire escapes and ropes from each room.

August 2, 1915. Paris, Tenn. Maxwell Hotel. Washington street. One 3-story building destroyed. Walls, wooden; ceiling, plastered. Floors, wood. Roofs, combination, said to be fireproof. Cause, possibly defective flue—or may have been caused by lighted cigar. Fire started in third story. Discovered by smoke seen from outside about 8:20. Alarm, by telephone. Duration, two and one-half hours. Stopped at third story. Fire was favored by flimsy construction of upper stories. Private fire apparatus, 2-inch hose on each floor. Means of escape, fire escapes. Value of building and contents, $12,000. Property loss, $4,000 to $5,000.

August 3, 1915. Laird, Sask. Hotel Laird. Second street, west. Two buildings destroyed, one-story and three-stories. Walls, frame. Floors, lumber. Roofs, tin. Cause, unknown. Fire started in cellar. Discovered by citizen about 4 a. m. Alarm, by village bell. Duration, four hours. Stopped at hotel and barn. Fire was favored by inflammable construction. Persons in building, three. Injured, none. Value of building and contents, $15,000. Property loss, total.

August 6, 1915. Jefferson, Mass. Summit House, a summer hotel, Summit avenue. One building partially destroyed, three stories. Walls, wood. Floors, wood. Roofs, shingle. Cause, defective chimney. Fire started near chimney in front part of house. Discovered about 12:45 a. m. Alarm, by telephone. Duration, three hours. Private fire apparatus, three

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hand chemical extinguishers. Persons in building, 50. Injured, one slightly cut by falling glass. Means of escape, knotted ropes which were not used, as all had ample time to escape by stairways. Value of building and contents, $25,000. Property loss, total.

August 14, 1915. Asbury Park, N. J. Carlton Hotel. Corner First avenue and Berg street. One building destroyed, four stories. Walls, frame. Floors, frame. Roofs, wooden shingles. Cause, electric wires. Fire started under roof of porch of first story, discovered by a passerby about 8:15 p. m. Alarm, by Gamewell system. Duration, three and one-half hours. Fire confined to building. Fire was favored by frame construction. Persons in building, very few at time of fire. Injured, none. Means of escape, one fire escape and outside rear stairs. Value of building and contents, $42,000. Property loss, $35,000.

August 24, 1915. Jersey City, N. J. American House. 93 Montgomery street. Hotel and lodging house. One 5-story building partly destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, cigarette. Fire started in fourth story. Discovered by citizen. About 8:50 a. m. Alarm, street box. Duration, 31 minutes. Stopped at fourth story. Persons in building about 25. Killed, two. Means of escape, fire escape. Value of building and contents, $18,000. Property loss, $3,500.

EYES AND THEIR PROTECTION

A National Safety Council Bulletin.

1. The secret of getting men to wear goggles is to use a little patience. Induce the workmen to give the goggles a few days' trial. Inquire each day how they are getting along. Sometimes it is necessary to pick out one man who is sympathetic with progressive ideas and convert him. He will help convert the others.

2. Get the right goggles. Inferior goggles not only ruin the eyes, but they afford absolutely no protection to the sight.

3. Be sure that goggles fit the wearer properly. Remember that no two faces are shaped alike. Men often complain that goggles hurt their eyes. This is not true when the lenses have plano-ground surfaces. The probabilities are the goggles do not fit.

4. Men with defective vision should wear goggles with corrected lenses.

5. Provide a case with every pair of goggles. Money will be saved by so doing, and the life of the goggles will be prolonged.

6. See that each man is provided with a cloth to clean his goggles. Renew the cloths frequently; this will encourage the men to keep their goggles clean.

7. It is of the utmost importance that goggles be inspected daily for the following defects: Cracked lenses, bent or broken screens, loose temple pieces, etc., etc.

8. Never give a workman a pair of goggles that have been previously worn until they have been sterilized. Use live steam for this purpose.

9. If a workman complains about his goggles, listen to him. The chances are that his trouble can be adjusted very easily.

10. If education and persuasion fail to convince men that they must protect their sight, there is only one course left, and that is discipline.

11. When showing visitors through plant, ask them to comply with the shop rules and wear goggles in departments where such are in use.

MR. WORKMAN: You possess five senses: Seeing, hearing, feeling, tasting, and smelling. Which is the most precious? Sight. Then why not protect it when it is in danger? If you lose your watch you can replace it; if you lose your sight, it is gone forever. Goggles may inconvenience you for a while, but better be inconvenienced than sightless.

HIGH DEGREE OF DISCIPLINE

Thirty per cent. of all accidents, due to the inherent recklessness, carelessness and disobedience of rules upon the part of the workmen themselves must be eliminated by educating the rank and file of employes out of instinctive recklessness into intuitive caution. This can be done only by developing in our shops a high degree of discipline, esprit de corps as it were, and naturally the manager and superintendent must set the pace. In several of our large industrial establishments this development has already attained a high degree of perfection.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

THE KING-BRAYTON FACE MASK

There has long been a need for a mask which would afford proper protection from heat and at the same time be convenient to use and easy to wear.

There are many departments in industrial work where such protection is necessary and certain work where it is vital.

In response to requests for such a mask, the Julius King Optical Company is now introducing the King-Brayton Face Mask, patented by Mr. J. T. Brayton.

A brief description of the device will show how well the illustrations convey the idea of its simple operation.

A woolen skull cap forms the support. This affords very good protection to the head against heat and has the advantage of being non-inflammable, as compared with the cotton caps at present being worn quite generally, especially by firemen in a boiler room.

The cap is adjustable by a clever device which insures its fitting any sized head. The mask itself is constructed of very stiff but light fiber, used considerably in electric work and is a non-conductor. The mask is pivoted at an attachment in either side of the cap. Its normal position, when in use

and turned down, is clearly shown in the illustration. When not in use it may be turned back, as is also shown. The mask is so light that the operator is unconscious it is on his head, but it is accessible for instant use at any time. A strap which is adjustable is attached to the cap, and the end looped in a slot at the top of the fiber shield. This acts as a stop so that the mask can be raised or lowered as much as desired, and it always comes back to that position.

To properly protect the eyes from heat, flying particles or molten metal, it has been deemed advisable to use monogramed lenses accurately surface ground of the full strength, supplied in the type of goggle approved by the Workmen's Compensation Bureau and the Underwriters' Laboratories.

The importance of furnishing only lenses to the men which are accurately surface ground to absolute plano should not be overlooked. Some men often look for an excuse to make a complaint that the lenses are not suitable. Monogramed lenses are for this reason preferable.

These lenses are set the proper distance apart to give the greatest field of vision and are inserted in white metal rims that will not rust or tarnish. When broken new lenses may be instantly inserted by means of a screw-end piece.

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To add to the safety features of this mask, large round perforated disks of white metal are set in each side behind the lenses so full vision may be had in each side. This will give the wearer opportunity to avoid danger, such as a traveling crane, which might injure him should he not have an unobstructed view at these points.

The mask should be adjusted so it fully protects the whole face from heat, and as the operator usually leans slightly forward good protection is even afforded the chin.

Beyond a temperature of 2,000 degrees Fahrenheit, colored lenses should be used, the color entirely dependent upon the character of the work to be done. This will insure against the danger of the ultra violet and infra red rays hurting the eyes of the men and impairing their vision.

The mask is especially designed and intended for use in Lap welding. At present these operators use a makeshift fiber mask swung at the waist or neck by a cord. A wooden peg is made fast below the center which the men hold between the teeth. The whole affair is unsanitary and should not be allowed in any up-to-date plant.

These masks will also be found of the greatest utility for all around use at the open hearth, for firemen in boiler rooms, for ladle men, pouring steel, especially hand pouring from a crucible. They should also be used at the blast furnace while tapping. Other uses will also suggest themselves, and taken all in all the King-Brayton Mask is assured of the success it deserves from the start and as a "Safety First" proposition cannot be excelled where trying conditions of heat are encountered.

SUCCESSFUL TEST OF THE RELC STATIONARY CHEMICAL FIRE EXTINGUISHER

In the presence of prominent fire and accident preventionists, a test was made recently in a 6-story building in William street, New York, of the Relc Stationery Chemical Fire Extinguisher. The efficiency of this new fire-fighting apparatus was well demonstrated.

A tank, containing 200 gallons of solution of bicarbonate of soda, in which is balanced a lead bottle containing sulphuric acid, was placed on the top floor of the building, and from this tank extended throughout the building a pipe system with hose stations on each floor and automatic sprinkler heads protecting the basement.

The demonstration was satisfactory in every respect, the engine operating without a hitch. Powerful streams of the chemical solution continued to flow from both hose and automatic sprinklers at the same time until the tank was empty.

The Relc Stationery Extinguisher is operated on the same principle as the chemical engine used in city fire departments. The pipe system is filled with air under 10 or 15 pounds pressure. On releasing the air at any hose station, a piston-rod holding a bottle in an upright position is moved from its socket and the contents of the bottle flow into the soda solution and form carbonic acid gas. The engine is put into operation by simply turning the handle of a valve at any hose station. A gauge indicates the amount of air pressure in the pipe, and in case the pressure falls below a fixed point a buzzer rings and continues to ring until the pressure is corrected. If the engine is called into action on account of fire, an alarm is sounded throughout the building.

The Relc Extinguisher can be put into operation instantly by turning a valve at the hose station on any floor, thus saving the time necessary in notifying the fire department and awaiting arrival of the fire engine. It is claimed for this system that a number of fires have occurred in buildings, but none thus far have passed beyond control where the Relc Extinguisher was in operation. Any portion of a building that is particularly hazardous may be protected by a sprinkler system connected with the Relc Engine. The fusing of a sprinkler head releases the air in the pipe system and puts the engine automatically in operation, and in place of water the chemical solution flows from the sprinkler.

The Relc Extinguisher has been approved by the Underwriters' Laboratories and is adapted to many different classes of buildings, such as hotels, apartment houses, private houses, factories, stores, office buildings, hospitals, etc.

BUILDING CODES

Virgil G. Marani, former building commissioner of Cleveland, has prepared some pertinent suggestions relating to fire protection for cities when formulating a building code. Mr. Marani investigated somewhat thoroughly the regulations covering building construction in the 50 leading cities of the United States.

There is now in course of preparation a standard building code, and the following is taken from a portion of the fireproofing section: Non-bearing fireproof partitions in fireproof and other buildings; non-bearing fireproof enclosures for stairways and elevators, openings in fireproof buildings; column covering (steel protection) in fireproof and other buildings; fireproof floor construction in buildings; fireproof plain or reinforced book tile for roofs, in fireproof and other buildings.

In this booklet also appears a list of tests upon gypsum and other information of interest to architects, engineers, contractors and manufacturers. A copy of these building code suggestions can be obtained from V. G. Marani, consulting engineer, 1900 Euclid avenue, Cleveland, Ohio.

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VALUE OF EYE-GLASSES FOR WORKMEN

One of the interesting displays at the Collective Insurance and Universal Safety Exhibit at the Panama-Pacific Exposition is the safety glasses on display by T. A. Willson & Company, of Reading, Pa. Twelve different styles of safety glasses are on view, placed in a metal case with a glass top, so that they may be more easily observed.

There are styles of glasses adapted for the use of grinders, machinists and others who require protection from flying particles. There are seven different kinds of these glasses, some with metal shields, some with leather shields, and various small differences for different branches of work. There are also glasses adapted to the work of furnace men and welders. About three-fourths of the glass is colored dark blue to protect the workman from the glare; the remaining part is left uncolored in order that the workman may see to move about and handle his tools.

One pair of glasses has been purposely broken in order to illustrate the protective rim that prevents the glass, when broken, from falling back into the eye of the wearer. There are also rubber and leather goggles on display.

Beside the case is a poster that tells, by means of mottoes and pictures, the story of a workman who, through the neglect of an order to put on safety glasses, lost his eyesight.

POWER'S CAMERAGRAPH No. 6B USED AT CHEMICAL EXPOSITION

A Power's Cameragraph No. 6B motion picture projecting machine was used at the National Exposition of Chemical Industries during the week of September 20 at the Grand Central Palace, New York, to project the motion pictures depicting the many different phrases of the chemical industries throughout the world.

A HANDY "SAFETY FIRST" KIT

The necessity for having at hand in factories and manufacturing plants a "'Safety First' Aid Kit" for rendering first aid service to the injured, is fully recognized by accident preventionists and safety officials.

The Safety First Aid Kit Manufacturing Company, 1 Madison avenue, New York, is now introducing a first aid kit which contains the necessary instruments, medicines, bandages, etc., for giving prompt aid to the injured.

UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

CABLES, ARMORED. Safety Armorite Conduit Co. Sterling armored cable. Helical wire armor type.

DOORS AND SHUTTERS, HARDWARE. James Peters & Son. Panic Bar Latch Release for use in connection with standard swinging tin clad fire door hardware.

FIREPROOFING PROCESS. For Gin Baled Cotton. Cotton Protecting Co. Process for chemically treating gin baled cotton to render it proof against spark and flash fire and country damage.

FUSIBLE LINK. J. W. Yates. Fusible link for use in connection with automatic closing devices for doors, windows and other automatic devices requiring fusible links.

GAUGE GASOLINE. S. F. Bowser & Co., Inc. Float gauge for indicating level of gasoline in underground storage tanks.

INSIDE HAND-OPERATED DISCHARGE DEVICE. The Non-Explosive Can Co. Vertical, single-acting, single and double cylinder pumps, designed for use with Inside Discharge Systems for handling hazardous liquids.

PANELBOARDS. Detroit Fuse & Mfg. Co. Detroit ironclad switchboards in which standard, labeled, enclosed switches made by above-named Manufacturer are assembled to specifications, and are mounted on a metal structure in which all current-carrying parts are entirely enclosed.

WINDOWS. Solar Metal Products Co., Inc. Heavy Steel Metal Window Glazed with Wired Glass.

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SAFETY ENGINEERING

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Current Comment and News

GREAT national meetings that have been held during the past few weeks show that the United States is becoming aroused on the subject of safety—an awakening for which there is much need. The Fourth Annual Safety Congress, held in Philadelphia under the auspices of the National Safety Council, was attended by 1,800 earnest men, who are engaged in the work of reducing the number of accidents in industrial plants. The Safety First Federation, organized a few months ago, is devoting its energies largely to the prevention of accidents in the streets. What the safety movement in America has accomplished in recent years encourages the belief that the far greater work that remains to be done will have intelligent and effective attention. The opinion may be expressed that it will be a good thing for the safety cause, and tend to prevent loss or duplication of effort, if the National Safety Council and the Safety First Federation may come to-

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ARTHUR T. MOREY
President, National Safety Council

gether, as outlined in the communications between the associations published on another page. The star in the crown of the Goddess of Safety will shine the brighter if there is co-operation—and no competition whatever—in the safety movement. The Goddess of Safety was drawn by Mr. M. F. Shea, of Philadelphia, for the National Safety Council and SAFETY ENGINEERING has pleasure in presenting her to its readers.

The third Pennsylvania Welfare, Efficiency and Engineering Conference was held in the Capitol, Harrisburg, on Tuesday, Wednesday and Thursday, November 16, 17 and 18. The conference was called for the purpose of familiarizing the public and the various departments of the State government with the work of the separate departments which have to do in a responsible manner with State engineering projects, natural resources and industries. Heads of the various departments gave descriptions of the work under their control and its relation to the public. Addresses upon subjects relating to the work administered by the various branches of the State government cooperating in the conference were delivered by men qualified to speak upon the subjects assigned to them.

The coroner's jury that inquired into the recent fatal subway cave-ins in Seventh avenue and in Broadway, by which 8 persons were killed, attributed the cause to an excessive blast, but declared that there was no criminal negligence on the part of the United States

W. H. CAMERON
Secretary, National Safety Council

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Realty & Improvement Company, the contractors. The Bureau of Combustibles of the New York Fire Department, which has control of blasting operations, was censured for not carrying out, through its inspectors, the powers assigned to it by the code of ordinances. Recommendations were made that no traffic be permitted in the streets while blasting for subways is going on, and that the Public Service Commission designate the maximum distance at which temporary work should precede the construction of the permanent subway structure.

New York American. Copyright, 1915, International News Service.

Somebody Is To Blame! Until Those Responsible for Horrors Like the Fire in Brooklyn and the Triangle Fire Are Punished Such Horrors Will Continue

Students of the Dunwoody (Minn.) Industrial Institute have a "Safety First" organization, the functions of which are to inspect the entire building twice a week, make such recommendations to the principal as the members may decide upon, and eliminate, as far as possible, the dangers of accidents and fires. Committees from the two sections in machine work make a tour of the building twice a week, also submitting reports upon their findings. Fire escapes and doors and windows leading to them are inspected to ascertain whether they open easily and the condition of the fire escapes. Fire extinguishers are checked and the dates noted after which their contents are of no further value. Loose boards on floors or stairways and improper guards on machines are reported and corrected. Each member of the organization has a copy of the State fire regulations, and he is held responsible for a thorough knowledge of these rules. The faculty holds the work to be educational for boys who later may have charge of shops and is strict in holding them to account. The plan is to have a membership in the National Safety Council, which will enable the institute to obtain information concerning the latest inventions and ideas on safety devices. The boys wear "Safety First" goggles when working on emery wheels.

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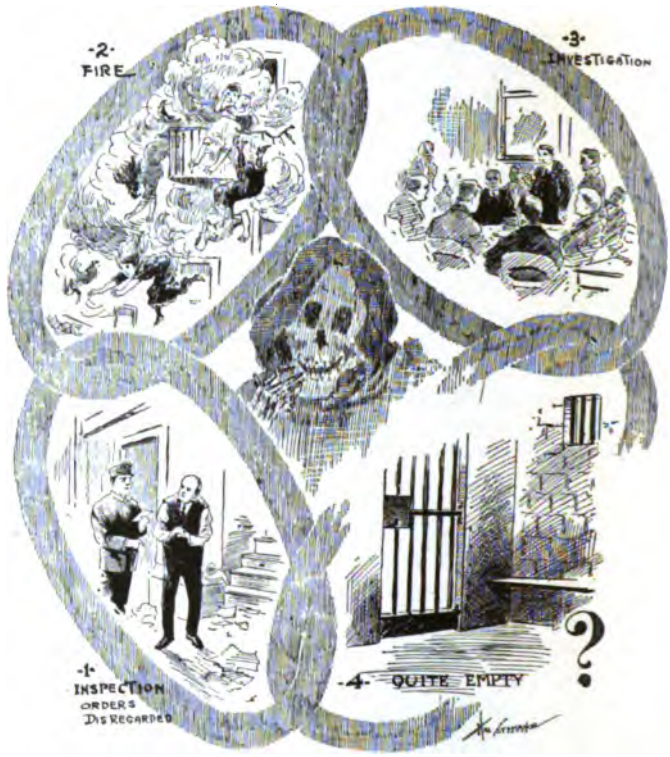
Information given out by Chief City Magistrate McAdoo, covering the operations of the motor vehicle law in Manhattan and the Bronx in the first six months of the current year, shows that during that period only one speeder was actually sent to prison, his punishment being 10 days. During the six months 137 persons were killed by motor vehicles, this figure covering the total for the five boroughs. Besides the solitary speeder who was jailed, there were in Manhattan and the Bronx 948 speeders who failed to pay their fines, and in that way automatically placed themselves in jail. Magistrate McAdoo's figures show that about one-third of the entire number of auto-speeders are owners of machines. Police Commissioner Woods has appealed to motor truck owners to gage their vehicles to a speed not exceeding 15 miles an hour. Information given out at the office of the Secretary of State at Albany says that in the four years the present automobile law has been in effect, 147 persons have been convicted of driving a machine while intoxicated.



New York Journal.

The Missing Link

Dr. Charles F. Pabst, a Brooklyn physician, has come forward with the suggestion that the clothing in which children play be made fireproof. His plan is to soak the garments in a solution of ammonium phosphate. Then there will be not the slightest danger to the child if its clothes come in contact with a blaze, according to the physician. He has made tests to bear out his claims; furthermore, the solution does no more harm to the clothing than so much water. The solution will keep indefinitely. It is non-poisonous and can be used for several suits. Lace curtains and other inflammable house decorations can be fireproofed by the same process, which has been approved by the American Society for Fire Prevention. During the recent epidemic of bichloride of mercury poisonings, Dr. Pabst succeeded in getting the leading drug houses of the country to put up bichloride tablets in packages of a distinctive shape and color, to emphasize their deadly character. New York City made his suggestion into an ordinance.

According to figures compiled by Albert H. Fay, mining engineer, Bureau of Mines, the number of fatalities in the metal mines of the United States during 1914 was 559 as compared with 683 in 1913. The number of men employed, however, for 1914 was 158,115, as compared with 191,276 in 1913. There is a slight reduction in the fatality rate over the previous year, the rate being 3.54 per 1,000 employed in 1914, as against 3.57 in 1913.

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Fire-Horrors in Factories

Tragedies in Brooklyn and Pittsburgh That Sacrificed Many Lives and the Lessons They Teach

AT least a dozen persons lost their lives on November 6, when the Diamond Candy Factory in North Sixth street, in the Williamsburg district of Brooklyn, was burned. Eight of the victims were girls and four were men. Others may die of their injuries. This fire recalls the Asch Building disaster, when 147 lives were sacrificed.

The Diamond Candy Factory was an old 4-story brick and wood building with a single outside fire escape and an emergency stairway extending through an opening enclosed by a wooden partition. The absence of fireproofing, the lack of sufficient fire escapes, and the fact that the main stairway led directly past an unused elevator shaft up which the fire ascended as through a flue, are declared to explain the loss of life.

Photo by O. F. Browning.

The Stairway Leading from the Second to the Third Floor, to the FASTENED DOOR, in the Brooklyn Candy Factory, That Prevented the Girls from Escaping

The candy company occupied the first and second floors where about 70 girls were employed, but, being a half holiday, there were comparatively few persons on these floors. The Essex Shirt Company, employing 60 girls and several men, occupied the third floor. The fourth floor was tenanted by a tailoring company. The Barasch Cloak Company, employing 40 girls, occupied the top floor. When the fire broke out there were about 200 persons in the building, all of them above the second floor.

In less than three minutes after a wreath of smoke had appeared in the unused elevator shaft, the flames burst out

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This Remarkable Photograph of the Diamond Candy Factory Was Taken After the Firemen Arrived at the Fire. The Girls Were Jumping from the Fire Escapes at the Time the Picture Was Taken

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Copyright, 1915, Underwood & Underwood, New York.

The Burning Candy Factory in Brooklyn Shortly After the Fire Started. Clothing on the Fire Escapes of the Killed and Injured

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Photo by Underwood & Underwood, New York.

Firemen Working at the Brooklyn Candy Factory. Seared by Flames with Their Clothing Ablaze, Girls Leaped From the Windows of this Building

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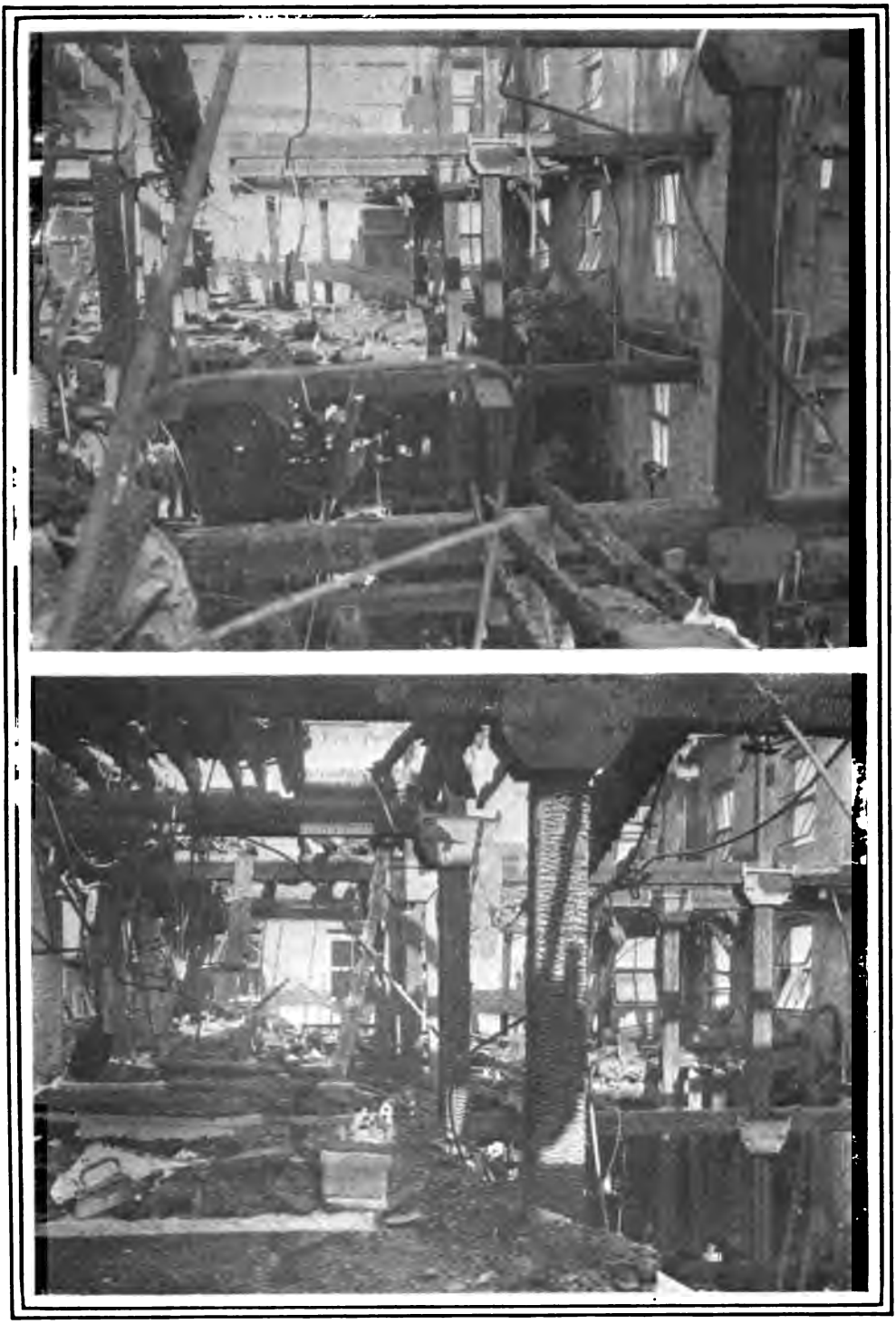

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Two Interior Views of the Diamond Candy Factory After the Fire, Showing How the Floors Fell In

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Photo by O. F. Browning.

The Bolt That Locked the Stairway Door at the Third Floor in the Brooklyn Candy Factory

on all the floors. The cry of fire was sounded and an alarm was sent in. The frightened occupants at once made for the stairs, which led from the entrance directly toward the rear of the building in a continuous ascent of four flights. Up the front of the building ran the only fire escape, to which the girls and men rushed, each one fighting for a foothold on the crowded structure. On the first floor the frenzied employes had trouble with the drop-ladder, which they could not get into place. Extension ladders were raised by the firemen, who were unable to ascend them because of the intense heat.

In the meantime several girls had leaped to the pavement, crushing out their lives. Hose streams poured tons of water into each story while the ill-fated employes were groping through flames and smoke endeavoring to find an opening. Several hours elapsed before the flames were extinguished and the charred bodies recovered.

Investigation has developed sufficient facts to show that the disaster was the result of neglect and a disobedience to orders in the enforcement of the factory laws. The State Industrial Commission has suspended the inspector in whose district the fire occurred, also the supervising inspector in charge of Long Island. Their dismissals may follow if the circumstances upon which they were suspended are established as facts. It was held that the negligence of these two officials was responsible for the casualty, as the improvements ordered on the building last January had not been made at the time of the fire.

Witnesses at the investigation testified that the door leading out of the candy factory was found locked by those endeavoring to escape, and they were held prisoners until the door was broken open. Edward L. Diamond, proprietor of the Candy Company, insisted that he had obeyed every order of the authorities relating to the fireproofing of his factory.

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Firemen Searching for Bodies on the Second Floor of the Brooklyn Factory the Day Following the Fire. This Picture Was Made Sunday Noon

He admitted that he received the order to fireproof the hallway six weeks ago, but that he had only just begun the work. It developed, also, that several years ago a man who had been injured in the Diamond Candy Factory, got a judgment for $18,000 against Diamond. Diamond then went into bankruptcy, and since then the title of the property and the business have been in the name of his wife.

Fire Marshal Brophy refused to commit himself, but it is understood that he obtained information to show that the fire was of incendiary origin. Both Diamond and his wife, and several others, are being held under heavy bail pending further investigation. James M. Lynch, State Industrial Commissioner, before Coroner Wagner's inquiry, testified that his department had issued orders for fireproofing of the building, but he did not remember whether any action had been taken. He said further: "I do not recall any attempt to enforce the orders. Ambiguity of the law seems to exempt 5-story buildings from control. The law provides for buildings over or under five stories, but does not specify 5-story buildings. I do not recall any case of non-compliance with our orders being reported to the district attorney. The rule is that if our orders are not complied with when the inspector calls the second time, the matter shall be referred to counsel. We have no system of checking up the reports of inspectors. Between September 28 and November 6, the date the Diamond building burned, our counsel did nothing. After all the investigations of that building something definite and vigorous should have been done. Our employes work seven hours a day. There is no law against working longer except the law of custom. It is not done in any of the State departments. I do not know how many of our orders have not been complied with—whether there were 10,000 or 100,000."

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THE PITTSBURGH TRAGEDY.

Thirteen girls and one man were suffocated, burned or crushed to death, and 20 were hurt, when flames swept through the Union Paper Box Company's factory in Pittsburgh, Pa., on October 25. The flames started in a feed store of the 4-story brick building. Hay and other inflammable material gave such impetus to the fire that the flames swept up through the elevator shaft to the third and fourth stories before the 30 girls employed in the box factory had time to realize their danger. When they attempted to escape they were driven back and trapped by the smoke. Those who escaped by jumping to adjoining buildings and the ground were more or less injured. Investigation was started at once by city and county officials, which resulted in the arrest of four persons, including the owner of the building and the officials of the box company. Two reports showing that the factory was exceedingly dangerous had been turned in to the Department of Public Safety within the past two months. County Fire Marshal T. L. Pfarr says that he condemned the structure to city officials last June. W. H. Kuhlman, whose duty it was to inspect the building for the fire department, says he reported a few months ago that there were insufficient means of exit at this building. Officials complained that inadequate building laws and insufficient powers had handicapped them in preventing catastrophes of this kind. Commissioner of Labor and Industry Jackson has issued special instructions to State inspectors and department employes to call the attention of owners of buildings and employers to fire hazards, and he asks the aid of residents of communities in the work of obtaining improvements.

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Firemen Taking Girls from the Fourth Story of the Union Paper Box Company's Factory, Pittsburgh

UNENFORCED LAWS AND DISAVOWALS OF RESPONSIBILITY

About as sickening as the tragedies

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Union Paper Box Company Fire, Pittsburgh. Top—Photograph Taken at the Moment the Roof Collapsed. Bottom—Firemen Engaged in Rescue Work

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themselves are the customary attempts of officials to disavow responsibility and shift the blame for the calamities. We have the spectacle of city and State governments impotent to protect their factory workers from wholesale slaughter, yet their officials issue voluminous statements designed to exonerate themselves and their departments. The laws of New York did not tolerate the fire hazard in the Brooklyn factory, and the State industrial commission, through its inspectors, called the owners to account. But the machinery of the law was too slow.

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A View of the Union Paper Box Company Fire Soon After It Broke Out

There is no doubt that conditions are little short of chaotic. Vital defects should be remedied, for laws that allow a conflict of authority and make it impossible to fix responsibility are travesties on "Safety First." A law that allows the fire department to make several reports and issue orders against the building without giving it the power to enforce those orders, is worse than no law. A law that gives factory inspection over to a State department, which according to the word of the chief official is incapable adequately to perform such duties, is of no account. There appears to be a sufficiency of New York law, but a lack of enforcement.

The Pittsburgh casualty brought the city face to face with the fact that its fire-fighting equipment is defective. To have 20 sections of hose burst at the critical moment is a serious reflection on some one. It is understood that demands had been made by the firemen for new hose, which had been refused. The chief building inspector said that so far as he had been able to learn, the box factory had never been subjected to a rigid inspection since it was built ten years ago. He declared further that there is not a sufficient number of men employed in the bureau of building inspection to examine every mercantile building in the city, although he had advocated such a plan for several years. He gave this as a reason why the box factory had never been inspected.

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The Slaughter of Innocents

The School Fire in Peabody, Mass., Was Only One of the 153 School Fires in 1915 That Have Already Taken Place

THE burning of St. John's Parochial School at Peabody, Mass., on October 28, resulting in the death of 21 pupils ranging in age from seven to seventeen years, was the result of unwise construction—the ignoring of every principle of safety when the building was erected. It was three stories in height with a basement partially above ground. The whole interior, including floors and stairs, was of inflammable wood. The doors at the main entrance opened inward. No provision had been made in the shape of fire-fighting facilities—an obvious trust in the success of the fire drill for the 600 children to make their escape in case of emergency. In this instance the drill alarm was given as soon as flames were discovered in the basement, but in descending the main stairs one of the pupils fell, causing a jam in front of the main entrance, and making it impossible to open the doors. A rear door which had been provided for emergency also became jammed when a rush was made to pass through. This exit, however, was re-opened and many of the children made their escape. Those on the lower floor dropped safely to the ground. From the second floor many of the pupils jumped into the coats of the firemen and bystanders. Of the 21 who lost their lives not more than one-half died from the effects of burns; the lives of the remainder were crushed out in the panic.

The building seems to have been constructed without the least regard for the safety of the many hundreds of lives that it was intended to contain daily. Not even a hand extinguisher, or a line of hose, was on the premises, and the nearest city hydrant was more than 400 feet away. Of course this proved a handicap to the firemen. There were no fire escapes such as the laws of Massachusetts call for.

ONE HUNDRED AND FIFTY-THREE SCHOOL FIRES IN 1915.

As is always the case after a fatal fire in a public or private school or in a college dormitory, when a large number of lives are lost, various communities wake up for a few days. New York City has ascertained that 35 school buildings are firetraps and should be shut up.

Since the first of 1915 no less than 153 fires in schools and colleges have been reported to SAFETY ENGINEERING, showing that the whole country should be alarmed and stay alarmed with regard to fire perils to school children.

In commenting upon the existing conditions in the New York public schools, Commissioner Adamson says the 35 condemned buildings have open stairways above the first floor, and in some instances have wooden stairways leading to the basement, despite the fact that he called the attention of the building bureau to this matter more than a year ago, and ordered that all the stairways be fireproofed. The superintendent of the building bureau admits having received the order, but as yet has not complied with it, because of the failure of the board of estimate to appropriate the necessary funds. It appears that the neglect to make these changes has just been disclosed, and as a sort of mitigating opiate Superintendent Snyder tells the public that the buildings under question are not considered especially dangerous, or they would be closed, adding incidentally, that the fire risk would be greatly lessened if the orders of the fire commissioner were carried out.

ALL "SAFE" IN BOSTON.

Actuated by the Peabody disaster, the mayor and some of the public officials of Boston have hastened to allay fear in that city, by announcing that its public schools are all safe. But Fire Prevention Commissioner O'Keefe talks differently. In quoting him a Boston newspaper says that some of the school buildings are in greater danger from fire than was the Peabody school. The newspaper calls attention to one particular building (which it claims is not unlike some of the others) that has no fire escapes. Its stairs are

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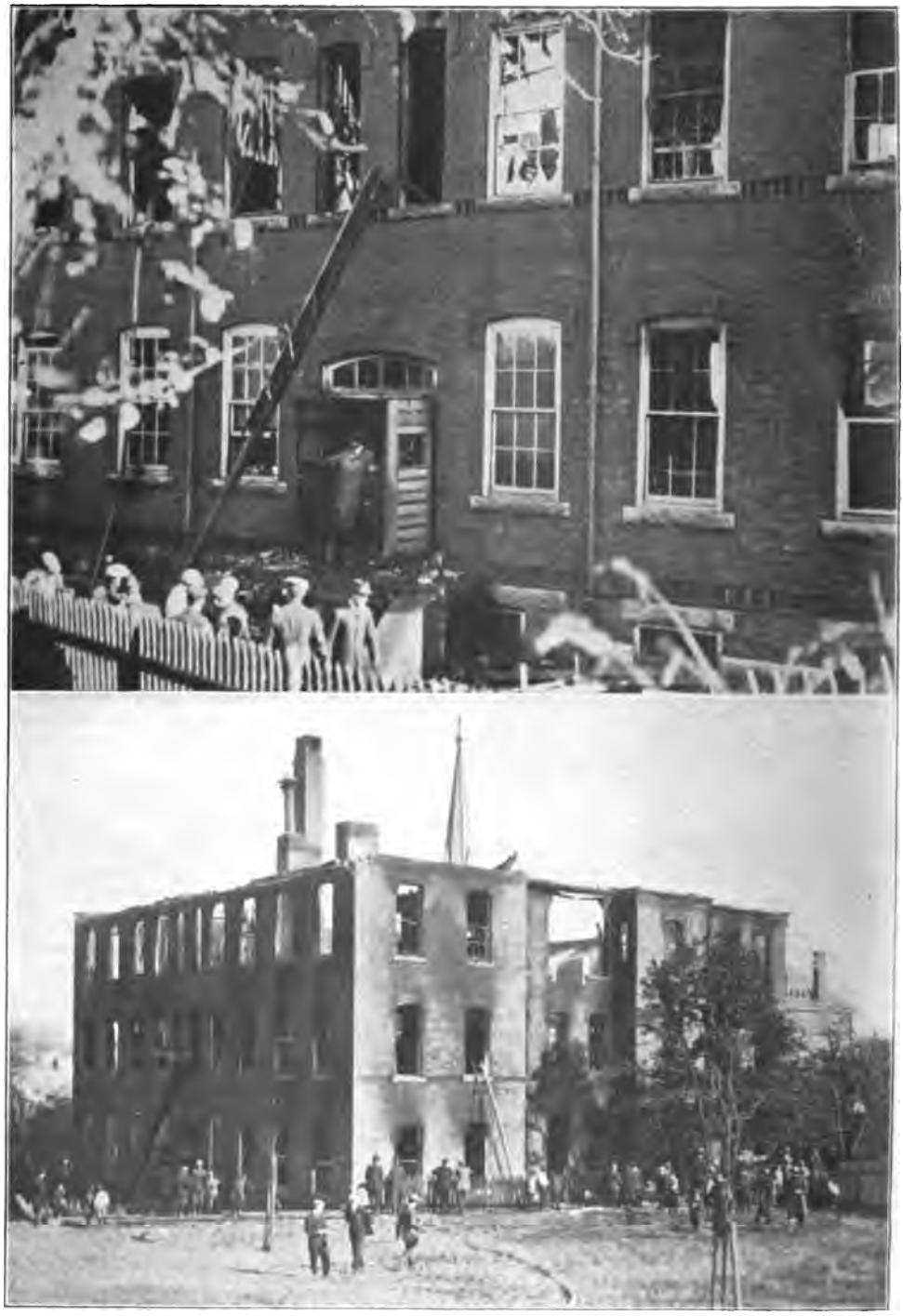

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Top—St. John's Parochial School, Peabody, Mass., on Fire. Bottom—After the Fire

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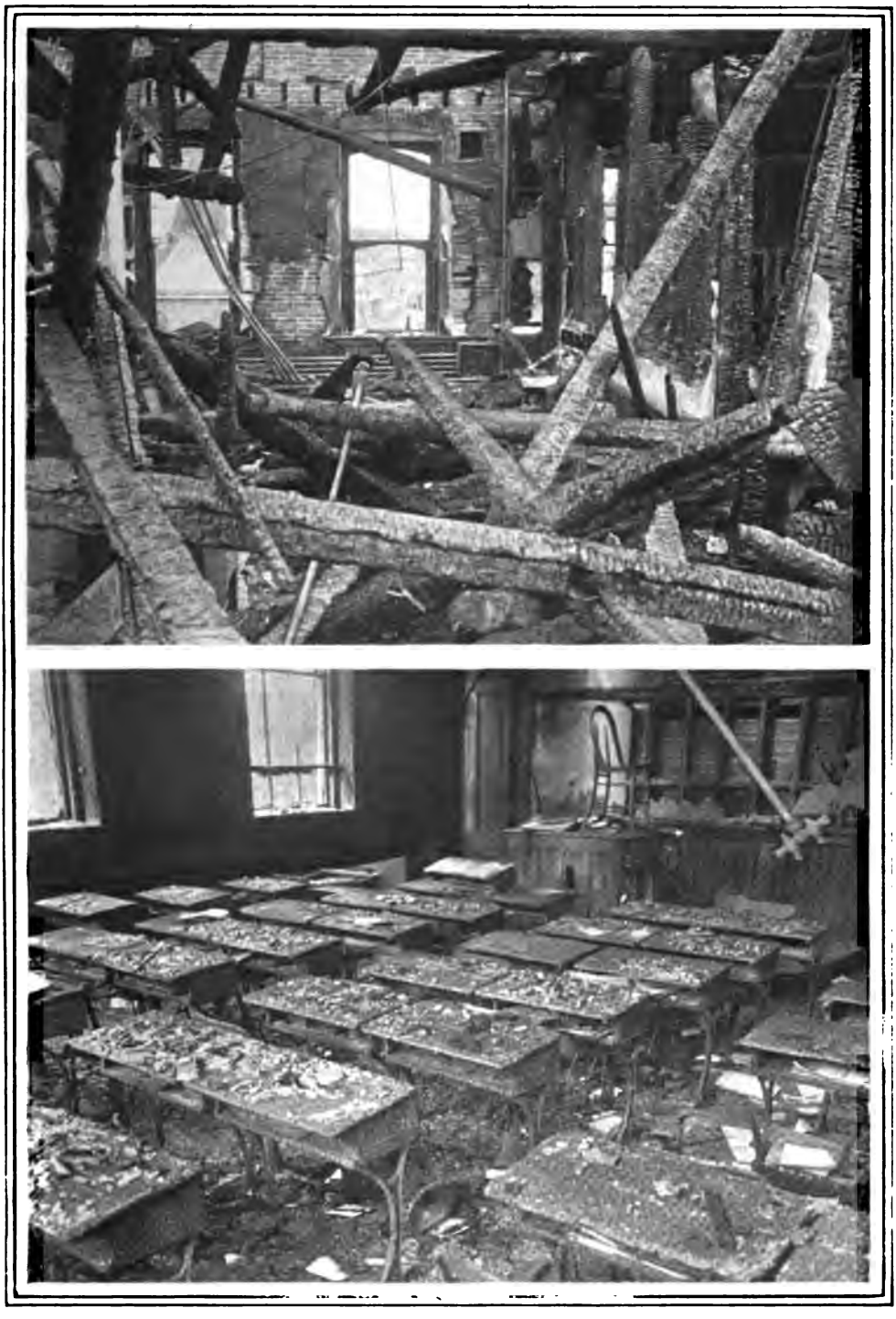

Photo by Rankins, Lynn, Mass.

Top—Second Story of St. John's Parochial School, Peabody, Mass., After the Fire. Bottom—A Class Room at the Rear of the First Story

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Courtesy of The Pittsburgh Post.

Ruins of Horner School, Wilkinsburg, Pa., Destroyed by Fire October 3

wooden. The basement is not isolated. The ceilings of the basement are of wood. The heater and flues are not in proper condition. Paper and rubbish are kept in wastebaskets and there is no fire hose. Twenty-two Boston school houses have wooden fire escapes; 120 have no fire escapes and are not of fireproof construction; 173 have wooden stairs and only 6 have automatic sprinklers.

FORESIGHT IN BUFFALO.

Contrast these conditions with those surrounding the public schools of Buffalo. Six years ago that city installed automatic sprinklers in 70 of her school buildings which have proved highly satisfactory in emergency. The ceilings and the under sides of the stairs were protected by steel and asbestos, and since 1909 all the public schools and additions in the City of Buffalo have been built of fireproof material. The total registration of the schools for the year of the installation of the automatic sprinkler systems was 62,000 pupils. The cost of the life-saving system was about 72 cents a pupil. This cost could be divided again by the number of years during which an automatic sprinkler system lasts.

A FORTUNATE ESCAPE.

When the Horner School at Wilkinsburg, Pa., near Pittsburgh, burned on October 3, it was fortunate, indeed, that it occurred early on Sunday morning, when no one was in the building, otherwise the story of the Collinwood fire, of a few years ago, or that of the St. John's Parochial School at Peabody, Mass., might have been repeated. The Horner School was a 2-story structure, with brick walls, wood floors and slate and gravel roof. The cause of the fire is unknown. The fire burned for three hours. The means of escape from the building was not reported to SAFETY ENGINEERING.

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Fourth Annual Safety Congress

Twelve Safety Meetings, Six Going at a Time—Accident Prevention and Factory Sanitation Discussed by Practical Men

THE National Safety Congress, which met in Philadelphia, October 19 to 21, was not a congress in the ordinary sense of the word, but rather a battery of twelve safety meetings, six of them going at one time. The 1,800 men who attended these safety meetings represented all the manufacturing States in the Union. They were the type of men one finds among superintendents and foremen, men who have come up out of shop experience and been placed in charge of accident prevention and factory sanitation. To these men the congress meant serious business—they were there to learn. The whole congress presented a picture of earnest, hardheaded, busy men, exchanging experiences and suggestions and endeavoring to work out the most efficient methods of preventing men, women and children from being killed in the industries.

ENTHUSIASM OF THE HUNDREDS WHO WERE PRESENT.

Outsiders who attend these gatherings are always impressed by the enthusiasm which animates the members. The reason for the enthusiasm is not hard to find. One need only to ask the first man one meets why he is enthusiastic and he will say at once that it is because in his own plant he has succeeded in reducing the number of deaths and serious injuries one-quarter, one-half, or three-quarters, as the case may be. This has a tremendous human appeal and makes the work seem worth while. And he will also remark, probably that they have discovered that safety pays in dollars and cents, that it is now given a place as a legitimate part of an efficient shop organization.

FEATURES OF THE DISCUSSIONS.

The following sectional meetings were conducted, each one devoting itself to the discussion of the problems peculiar to the industry, such as the guarding of particular machines, the elimination of dangerous practices, and, especially, the problem of how to secure the interest and co-operation of the workmen: Cement Manufacture, Laundries, Mining, Paper Mills, Public Utilities, Textile Mills, Foundries, Woodworking Plants, Medical Examination of Employes, Safeguarding of Machinery and Railroads. The last half day of the congress was devoted to a general round table meeting, composed of all sections, at which was discussed the subject of "How to Educate the Workman in Safety." The real work of the congress was done at the round-table meeting. The old experienced men were there and gave the beginners the benefit of their knowledge. Each man was given a chance to ask questions bearing on his own safety troubles, or to tell of some device or method which had secured results in his own plant.

CHAIRMEN OF THE SECTIONAL ORGANIZATIONS.

The sections have now become permanent departments of the National Safety Council's work, and are organized with officers and committees for the purpose of developing standards for safety and sanitation which are peculiar to the industry:

Laundry Section: E. G. Trimble, Manager, Employers Indemnity Exchange, Kansas City, Mo., Chairman.

Mining Section: H. M. Wilson, of the Associated Companies, Pittsburgh, Pa., Chairman.

Paper Manufacturers Section: S. F. Shattuck, Treasurer, Kimberly-Clark Company, Neenah, Wis., Chairman.

Public Utilities Section: H. C. Lucas, Treasurer, Philadelphia Electric Company, Philadelphia, Pa., Chairman.

Railroad Section: M. A. Dow, General Safety Agent, New York Central Lines, New York City, Chairman.

Textile Section: W. C. Swallow, Agent, Amoskeag Manufacturing Company, Manchester, N. H., Chairman.

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The Safety Round Table in the Center of the Exhibition Room

Medical Section: Dr. Otto P. Geier, Manager Department of Safety & Sanitation, Cincinnati Milling Machine Company, Cincinnati, Chairman.

Chemical Section: J. R. de la Torre Bueno, Secretary Central Service Committee, General Chemical Company, New York City, Chairman.

Iron & Steel Manufacturers Section: J. M. Woltz, Safety Director, Youngstown Sheet & Tube Company, Youngstown, O., Chairman.

Electrical Railway Section: George Oliver Smith, Supervisor of Safety, Doherty Operating Company, New York City, Chairman.

Public Safety Section: Edward C. Spring, Lehigh Valley Rapid Transit Company, Allentown, Pa., Chairman.

Foundry Section: O. H. Fehling, Manager, National Malleable Castings Company, Chicago, Ill., Chairman.

SAFETY EXHIBITS AT PHILADELPHIA.

The safety exhibit is always one of the interesting features of the National Safety Congress. The exhibit this year was of special interest because it was devoted largely to the educational side of safety work. Possibly, the feature which attracted the most attention and was of the greatest value to safety men was the display of twenty bulletin boards, each contributed by some company doing good safety work. On the bulletin boards were posted photographs, reports, stories of accidents, etc., that the companies had found most effective in

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Exhibit of Twenty Bulletin Boards by Corporations Prominent in Safety Work

A First-Aid Room, Completely Equipped

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Exhibit of Illuminating Engineers' Society Showing Lamps and Reflection for Shop Lighting

reaching the workmen and in keeping up their interest. Among safety men the use of the bulletin board has come to be recognized more and more as a valuable asset. It is a cheap and convenient shop newspaper on which is posted, from week to week, fresh and suggestive items that drive home to the men the importance of caring for their own lives and limbs. One bulletin board that attracted special attention consisted of a large case inclosed with glass, containing 42 pairs of goggles. One lens of each pair of goggles was broken and over the face of the other lens was pasted a piece of paper on which was written the name of the man who wore the goggles and the story of the accident. Across the face of the bulletin board was this statement: "Forty-two eyes saved in 10 months." It is this sort of an exhibit that gets under the vests of the workmen and convinces them that "Safety First" is not a fad but a serious business—and that it gets results.

Around the exhibit room was posted a series of mottoes or safety slogans. Here is a sample: "Thirty thousand persons killed by accidents in the United States each year. Seventy-five per cent can be prevented. This means 22,500 lives saved. Join the crusade." In one corner of the exhibit the Illuminating Engineers' Society of America had built a complete room and fitted it up with various types of lamps and reflectors representing the most efficient equipments for shop lighting. In another corner was an exhibit of a completely equipped first-aid room. In the center of the room was a large round table and on the top of this table, laid out in graphic form, was an exhibit which included a complete outline of "How to Organize and Conduct a Safety Round Table." In one section of this exhibit was included a map of the United States showing the location of all of the safety round tables. The story of "How to Start a Safety Campaign" was told in five large posters which included not only suggestions of how to organize the campaign, but also complete outlines of the talks that should be given by the manager to the workmen, by the superintendent to the foremen, and by the fore-

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Fourth Annual Safety Congress, National Safety Council. The Banquet at the Bellevue-Stratford Hotel, Philadelphia, October 20

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men to the movement and suggestions to inspection committees on "How to Inspect."

NATIONAL SAFETY COUNCIL SERVICE.

A complete exhibit was shown of the various bulletins that are sent out each week by the National Safety Council. This exhibit represented the splendid service the organization is rendering to its members by placing in their hands the very best experience gathered from all companies which are doing safety work. The exhibit also included photographs, story magazines and pamphlets issued by different companies.

The National Safety Council has had a phenomenal growth. It was organized two years ago in New York and now includes a membership of 1,450 large industrial concerns, associations, state departments, etc., and this membership includes approximately 5,500 representatives. The council has come to be considered the one National organization that is recognized as the leader of the great safety movement which is gaining such headway over the country. It has recently absorbed the American Mine Safety Association and the Railroad Safety Association.

PLANS FOR 1915-16.

During the coming year the council will extend its work to the colleges, and especially the engineering schools—through its sectional organizations; through its 23 local councils; through its traveling safety exhibits and a wide distribution of safety bulletins and posters and the special information its well equipped library provides. The fourth annual congress and the good work the council is doing every day in the week indicate that the safety movement is a practical and efficient work and one worthy of the consideration of every employer and employe in the country.

Architects' Work for Safety and Sanitation

By R. Clipston Sturgis, President, American Institute of Architects

ONE might say that the architect is more interested in good construction than the fire insurance companies; that he is more interested in hygiene than the doctors or health departments. Every single building that he builds has something to do with one or the other of those questions.

We argue with the owner that it isn't common sense for him to build substantial walls to his building and frame the whole thing inside, floors and partitions, with wood. Not only from the fire point of view, but because he has a construction that is moving all the time with heat and cold and dryness and moisture; and in the course of a few years his repairs will outweigh the original saving.

Nearly all of our cities allow wooden construction in the immediate outskirts, even if it is not permitted in the civic centers. The wooden construction on the outskirts will soon be in the city. If it simply hurt the man whose house was burned up it would be of little moment. But it threatens the entire community. The man who goes out into the suburbs and builds reasonably, with brick or stone, fairly safe as far as outside conditions are concerned, is really not protected if surrounded by other buildings which are of wood. People have an idea that insurance companies pay the bills. They do not. We all pay, and if insurance rates are high, we all suffer.

In the prevention of disease, archite[illegible] have done much to be[illegible] condi[illegible] Schools have moved fr[illegible] hazard condition to h[illegible] scientific. Hospitals [illegible] wholesome and b[illegible] Buildings which ho[illegible] charge have chan[illegible] conditions shocki[illegible] ditions that are [illegible]

Of the mo[illegible] architects stud[illegible] one never s[illegible] glass, as the[illegible] under wo[illegible] with regar[illegible] tificial li[illegible] the eyes[illegible] that e[illegible]

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The National Safety Council

Address of the President at the Opening Session of the Fourth Annual Safety Congress, October 19

BY action of the board of directors, at the regular meeting October 13, 1914, and at a special meeting held April 30, 1915, two new classes of memberships were created, viz., Local Memberships and Service Memberships. The first provides a membership for persons who are not interested in the industrial problem, but who may be interested in the promotion of the activities of the local council. They have limited rights and pay not less than $1 annual dues, of which 80 per cent is retained by the local council. The second provides a membership for employees interested in safety, work, etc.

A gift key ... feet long, symbolizing ... freedom of the city ... delphia, was presented ... National Safety ... by Dr. F. D. Patterson ... ing for the ... adelphia. The ... ved on behalf of ... Safety Council ... Campbell.

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... reception and we hear nothing but flattering comments of it. It has already been adopted in many States and cities as a supplemental reader in the schools.

Early in the year negotiations were entered into, through a joint committee, with the Boy Scouts of America for the obtaining of the practical co-operation of that organization in our work. These negotiations have progressed most favorably and it is expected that before the next annual meeting a definite plan will have been agreed upon and put into effect, thus bringing into the safety fold some 400,000 of America's most intelligent young people.

As announced at the last annual meeting, efforts have been made to promote the organization of our membership into sections, to include in autonomous organizations the representatives of those industries which have special problems and hazards peculiar to their industry.

The steam railroad companies were the first to organize. An organization known as the American Railway Safety Association, duly chartered and practically unanimously affiliated with the National Safety Council and created our steam railroad section.

The American Mine Safety Association, duly chartered and in a body affiliated with the National Safety Council, transferring all its organizations and activities to our organization as our mining section.

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men to the workmen, and suggestions to inspection committees on "How to Inspect."

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In the prevention of disease, architects have done much to better conditions. Schools have moved from a purely haphazard condition to buildings accurately scientific. Hospitals are cleaner, more wholesome and better in every way. Buildings which house those in the public charge have changed in recent years from conditions shocking and horrible to conditions that are sanitary and wholesome.

Of the more particular things that architects study is light. Ten years ago one never saw factories, practically of glass, as they are today. Thus men work under wonderfully improved conditions, with regard to light and cleanliness. Artificial light has been studied so as to save the eyes of those who must work under that condition.

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A gilt key, three feet long, symbolizing the freedom of the city of Philadelphia, was presented to the National Safety Council by Dr. F. D. Patterson, acting for the mayor of Philadelphia. The key was received on behalf of the National Safety Council by President Campbell.

In spite of the prevailing depressed business situation, our membership has been very substantially increased (by practically 100 per cent, and so far as representatives are concerned, by over 130 per cent) since the last annual meeting. The number of cancellations has been exceedingly small and, in point of amount of dues, almost negligible.

The Service Series of Bulletins have been very popular and have been a splendid contribution to the safety cause, as has been the production of the book, "Sure Pop and the Safety Scouts." This book has met with a most remarkable reception and we hear nothing but flattering criticisms of it. It has already been adopted in many States and cities as a supplemental reader in the schools.

Early in the year negotiations were entered into, through a joint committee, with the Boy Scouts of America for the obtaining of the practical co-operation of that organization in our work. These negotiations have progressed most favorably and it is expected that before the next annual meeting a definite plan will have been agreed upon and put into effect, thus bringing into the safety fold some 400,000 of America's most intelligent young people.

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A number of those in attendance upon a recent meeting of the National Public Health Association, at a round table session of industrial surgeons, voted to request the National Safety Council to form a Medical and Health Supervision Section, and to perform the functions of a clearing house for information on that subject in the same manner as for safety data. As the executive committee had had in mind the formation of such a section, its functions, however, to be limited to preventive rather than remedial phases of the subject, the plan fell in readily with our own purposes.

A Public Safety Section has been planned for some time, but owing to the difficulty met with in obtaining a proper and efficient chairman, no definite organization has been effected.

A plan for the organization for safety work in communities, and activities to be engaged in was prepared and approved by the executive committee. This has not yet been printed nor distributed, as it was desired to have it approved by those who will constitute the public safety section before it should be issued.

Mr. William P. Eno, of Washington, D. C., international traffic expert, has donated to our organization the plates for his traffic regulations, which have been adopted by the cities of Paris, London, Washington, D. C., and New York, for use by us in a public safety propaganda. The printing of this has been withheld pending the revision of the preface by Mr. Eno and to enable the public safety section to pass upon it, also.

In February last information reached the executive committee of a proposed new organization to be known as the Safety First Federation. Certain of our directors, who were invited to the conference respecting the proposed organization, were authorized by the executive committee to invite this organization to come into the National Safety Council as its public safety section. This, however, did not seem desirable to the promoters of that society. Our invitation was not accepted and the Safety First Federation was organized limiting its field of activity to public safety.

We have in every way possible tried to indicate to that organization our desire to co-operate with it and to express our wishes for its success, as we think we should all welcome any activity, whether apparently competitive or not, which has for its object the conservation of human life and limb.

It was felt, however, that in view of the fact that so many of our public service members were interested in the public safety problem as well as the industrial, we must of necessity attempt to perform the same kind of service for them in the public safety field as in the industrial, and hence could not leave the field to the Safety First Federation. It is probably regrettable that there should be duplication of effort, but at the present time there seems no other alternative.

A meeting yesterday was attended by many of those interested in the public safety problem. A section was formed, a line of activity agreed upon and officers and committees selected to direct the work.

At the present point it may be well to state that it is the hope and desire of the executive committee that the sectional meetings will effect permanent organizations pursuant to terms of the resolution of the executive committee recently adopted providing for officers, executive committee and committees of sections. It is also desired that other sections than those having formal meetings at this congress will be organized during the congress in the same way. The advantages and benefits to be derived from such sectional organization within the council are too numerous and self-evident to require statement.

Many other matters of interest might be commented upon if time would permit. Much has been accomplished, but our field is large, its possibilities great and very many things are yet to be done. Time and a larger membership and revenue will make the fullest achievements possible. We can recommend a continuance of the policy of service and internal co-operation which has marked our past and a continued effort to retain the good will and co-operation of other agencies and activities that have the same or similar interests and objects.

No incident or experience is without its lesson and the war of Europe has been

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no exception, as there have been many important and valuable lessons for America growing out of it. We all can see, for instance, some defects at least in the national policies of the belligerents. In the main, England stands for the preservation of the rights and privileges of the individual, whereas every German is taught from the cradle up that the State is supreme and collective action the ideal. I believe that a blending of these two principles will help the American people and help us in the solution of our social and economic problems to profit by the advantages of both systems and yet not suffer from the extremes of either. In accident prevention work we aim at the preservation of the individual through the collective action of all. Employer and employe must work together for their mutual good, the safety field being a common ground upon which both should and must unite for the common good of all. We as men interested in the accident prevention movement, and as men charged with the duties incident to our safety work, should realize the peculiar importance of our work. We stand at the dividing point between the two, and we have it within our power to so use our position that with it as an instrument every ground of difference between employer and employe may be minimized and ultimately eliminated. Our opportunity is very great to make both employer and employe see the mutuality of their interests. The solution of the safety problem can only be accomplished by tactfully removing friction between employer and employe and by emphasizing the essential human quality of both by preaching the gospel of identity of interest. Our contribution to the world's progress, therefore, can be made broader than the specific limit of our duties. With this vision before you we would inspire you to more determined efforts to steadfastly make safety an established factor in social progress and the touchstone to the ideal that man's humanity to man will make countless thousands rejoice.

Metal Mine Accidents in 1914

By Albert H. Fay, Mining Engineer, United States Bureau of Mines

THE metal-mine-accident report for 1914 contains a study of mine accidents by mining methods, which is a departure from the previous reports and brings out some valuable information concerning stoping, caving, and room and pillar systems of mining as related to mine accidents. This part of the report deals with 258 mining companies representing 75,453 employes actually engaged in underground or open-pit mining, exclusive of those employed at surface shops and yards. The fatality rate for the various mining methods, classified, was as follows:

	Per 1,000
Overhand stoping in narrow ore bodies	4.90
Overhand stoping in wide ore bodies	5.23
Room and pillar	5.76
Caving systems	5.10
Open-pit with steam shovel	2.50
Open-pit without steam shovel	2.28

The average fatality rate for this group of mines, based on underground and open-pit employes, was 4.78 per 1,000 men employed. The serious injury rate for the same group of mines was 51.67 per 1,000, while the slight injuries show 270.46 per 1,000.

The following States show a reduction of more than 20 per cent in the fatality rate as compared with the preceding year: Kansas, Minnesota, New Jersey, New Mexico, Oregon, South Dakota, and Virginia, and the Territory of Alaska. Nevada and Montana are the only States that show a continuous reduction of fatal accidents during the four years covered by the bureau's reports.

The total number of fatalities in metal mines during 1914 was 559, as compared with 683 in 1913. On the basis of number of men employed there was a slight reduction in 1914 over 1913—3.54 per 1,000 men in 1914, against 3.57 in 1913. The serious injury rate for 1914 was 32.08 per 1,000, as compared with 30.79 for 1913. Slight injuries (loss of time of less than 20 days) numbered 159.02 per 1,000 in 1914, against 141.58 in 1913.

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How Safety Goggles Save Eyes

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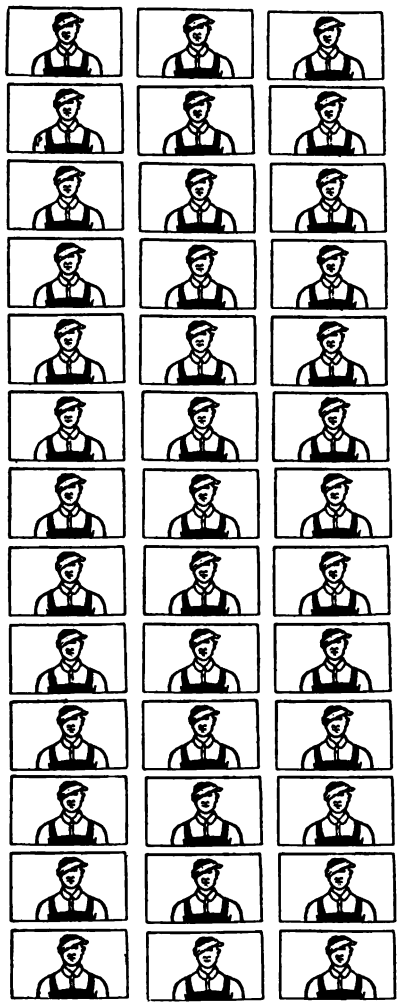
FOR a period of four years (1910-1913) the number of eye injuries per annum, per 1,000 full time men, in the plants of the American Locomotive Company, was 39—to be exact, 38.09. *In 1914 the use of safety goggles was established throughout the plants of the company.*

Before and After Using Safety Goggles in Plants of the American Locomotive Company



Thirty-nine eye injuries per 1,000 men before the use of safety goggles was required.

Blank spaces in above diagram represent eyes saved by the use of safety goggles.

In 1914 the number of eye injuries per 1,000 full time men was about 17—to be exact, 17.02. For the first six months of 1915 the number of eye injuries per 1,000 full time men was at the rate of less than 16 per annum—to be exact, 15.7.

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Safety in Crane Chain Practice

By Earl B. Morgan

Safety Engineer, Commonwealth Steel Company

Proceedings of the Fourth Annual Safety Congress, National Safety Council.

IT is, indeed, amazing to find the scant attention that the subject of strength of chains has received from investigators in the field of strength of materials. One can readily obtain from most any handbook a table of so-called safe loads, but the peculiar thing about these recommended safe loads is that when put to actual practice, the chains are not safe, but fail, and fail frequently, hazarding the lives of the many workmen over whose heads the supported loads are carried back and forth.

The peculiar thing about these chain failures is that the chain, after being subjected to a so-called safe load, as specified in handbooks, and safely resisting this loading repeatedly, suddenly fails under a loading seldom equal to and more often far less than the recommended loading. Furthermore, an examination of these sudden "pop" failures reveals that they are seldom due to a bad or burnt weld, or to a section of the link that has been weakened by wear or abrasion, but generally shows that they are due to a so-called crystallized link.

After quite an extended study of failures due to a crystallized link, the writer has concluded that they are due to imposed stresses equal to and in excess of the elastic limit, and in this brief discussion he will attempt to show that the crystallized link is undoubtedly due to overloading and cannot be prevented by annealing.

The term crystallization is undoubtedly a misnomer, as all steel and iron are originally crystalline in structure. What really takes place is that the working of the metal beyond the elastic limit simply breaks down the long fibers or granulates them, as it were. It is simply a condition of fatigue. The characteristic hardening or brittleness of the metal in this condition is undoubtedly due to the heat which is set up internally by the slippage of the fibers.

This is certainly most convincing evidence that something is radically wrong with our tables of so-called safe loads, as it is a well established principle in strength of materials that the extreme fibers of a material should infinitely resist imposed stresses within the elastic limit; of course, making reasonable allowance for deterioration due to rust and abrasive wear.

What does this mean? It means that if we purchase well made chains, inspect them regularly for detecting any deterioration due to wear and rough handling, and subject them to proper loading, they should last infinitely. It is also apparent that our problem is not one of remedying the so-called crystallized condition of the metal by annealing, but rather is it a matter of preventing it by subjecting the chain to a proper safe load.

What is this proper safe load?

It seems that most of the recommended tables of safe loads have been based upon the ultimate strength of the chain as developed by test, and it is interesting to note that these ultimate strengths are practically the same as can be derived by the empirical formula L equals 1.66 times the area of the section, times the ultimate strength of the material. In this formula it is assumed that there is twice the section available in tension and simply allows the difference for defective welding. Such a basis for safe loads has been erroneously supported by arguing that if a new 1-inch chain tests at an ultimate strength of 40,000 pounds it can be used at 10,000 pounds and, therefore, will have a safety factor of 4. This is an erroneous conclusion as an ultimate strength test of a chain will give a much higher result than the figures derived by designing the link as a structure based upon the permissible extreme fiber stress. This is readily understood when it is shown that

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the fiber in an open link is subjected to a stress in straight tension; plus one due to the bending moment, this being maximum at the four points of compound curvature.

When a chain is pulled in a tensile test to a rupture point, the failure is usually one in direct tension on the sides of the link, as the sides of the link have become straight and the bending stresses are no longer present, as this distortion takes place before the critical maximum point in the bending stresses occurs. So it can be seen there are absolutely no grounds for basing the safe working load upon such a test.

The writer is firmly convinced that the proper safe load should be based upon a permissible working stress for the extreme fiber, and not on the ultimate breaking strength test of the chain. This necessitates the solution of the maximum extreme fiber stress that is developed in an elliptical shape which is the usual shape of a chain link. This involves a theory which has received very meager attention in technical works. There seems to have been only one attempt to develop a formula for the fiber stress developed in an elliptical ring based on experiment and good sound theory. I refer to a thesis on the Strength of Chain Links made at the University of Illinois Experimental Station in 1907, in which the following formula was developed for open links. This formula can be readily derived by applying the theory of flexure in curved shapes.

$$f = \frac{P}{0.4d^2}$$

Where f = extreme fiber stress in tension

d = diameter of the stock used in link

P = load on the chain.

Let us now investigate a specific table of safe loads for only a few of the most commonly used sizes of chains, by applying this formula; substituting the values of the loads for P and solving for f, the extreme fiber stress developed thereby.

In SAFETY ENGINEERING for August, 1915, and also in a recent bulletin on Safe Loads issued by the National Safety Council, the following safe loads for straight suspension for W. I. handmade short link chain are recommended. The writer has found by actual experimental tests that these values are on an average of about 1/7 of the ultimate breaking strength, and are in fact a trifle lower than the loads imposed in general practice in most plants.

SIZE	SAFE LOAD
½-inch	2,400 pounds
⅝-inch	4,000 "
¾-inch	5,500 "
⅞-inch	7,500 "
1-inch	9,500 "

Now it is interesting to note that with these recommended safe loads the following stresses in the extreme fiber are developed by using the formula as cited above:

½-inch ..	24,000 lbs. per sq. in.
⅝-inch ..	25,600 " " " "
¾-inch ..	24,500 " " " "
⅞-inch ..	25,000 " " " "
1-inch ..	23,700 " " " "

Anyone familiar with the theory of the strength of materials can readily see what this means. It means that the extreme fiber will be stressed up to and in excess of the elastic limit in the case of an iron chain, as the writer has made repeated tensile tests on Norway or Swede iron, which is about as pure as any commercial iron obtainable, and has never developed more than an average ultimate tensile strength of 44,000 pounds per square inch, and an average elastic limit (or drop of the beam) of 23,500 pounds per square inch. This shows how such loading as exhibited produces stresses in excess of the elastic limit, notwithstanding the fact that the impact stresses due to mechanical braking in lowering the hoisted load, which are no doubt very severe under certain conditions, have been neglected. It is evident this magnifies the danger in applying stresses which will destroy the resiliency of the metal. This is, without a doubt, the reason why chain links become brittle and fail. It is also the reason why the average user encountering such difficulties resorts to annealing as a remedy.

There has been much said of late, both pro and con, concerning the annealing of

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chains for restoring the metal from the so-called crystallized condition to the original physical properties. No doubt this annealing is a good thing in that it often forestalls failure, not because the metal has been completely restored to its original quality, but because it has simply been made more tough. The writer has made several experiments on sections of metal taken from crystallized links, trying to find out whether annealing really does completely restore the metal. A series of four tests was made in each of the following cases: A test bar was prepared from a piece of original stock of Norway iron, which was used in making up several chains. These chains were put in service and subjected to loading in accordance with the tables recommended in handbooks, and after a short time became fatigued and failed. Two test bars were prepared from each side of the failed link, one bar being left in the fatigued condition and the other annealed to a temperature of 1,500 degrees F. These specimens were tested in a tensile machine with the following results. The figures exhibited are an average of four tests in each case.

Specimen.	Elastic Limit (Drop of Beam).	Ultimate Tensile Strength.	Per Cent Elongation.	Reduction of Area.	Fracture.
Original stock	25,600	41,500	48.5	78.4	Cup
Fatigued, not annealed.....	38,700	46,900	29.0	74.6	Irregular
Fatigued, annealed	30,000	44,300	47.0	78.3	¾ Cup

The chemical analysis of the original stock showed carbon, trace; phosphorus, .029; sulphur, .006; manganese, trace; silicon, trace.

A careful examination of the above test data will show that the annealing did not completely restore the original physical qualities of the iron. The writer does not feel that annealing is inadvisable, but is firmly convinced that annealing is not the cure for fatigue. Annealing chains is certainly a good additional safety factor in that it softens the metal and does away with the dangers of a brittle link. But the fact still remains that an annealed chain will undoubtedly fatigue if overloaded, so we are not going to have maximum safety in chain practice by all the proper annealing. What must be done is to revise the present code of so-called safe loads and base them on the rational basis of the permissible extreme fiber stress of the material used, using the same principles of design as are used in all structures, as after all, chain links, rings and hooks are only structures designed to resist imposed loading conditions.

It is going to be hard to remedy this overloading of chains, as a big misunderstanding has taken deep hold of the average mechanic and user of chains, and why not? Have not the best handbooks and authorities recommended these loads? To convince an old shop hand that a ⅝-inch iron chain should be worked to only 1,600 pounds in straight tension when he has been using it to about 5,000 pounds is, indeed, a hard proposition, as he feels it is perfectly safe because the chain has carried the load numerous times without failure.

In summarizing the writer feels that the following points should be closely observed to procure maximum safe conditions in crane chain practice:

1. Decide upon material desired, low carbon O. H. steel or an iron as nearly free from impurities as possible. A pure iron, I believe, is preferable to steel as it makes a better weld than steel, and also an iron link will stretch out to a lock more easily if overloaded, which serves as a telltale for inspection.

2. Prepare a rigid set of specifications covering the material, workmanship, and tests desired.

3. Insist on a hand-made link, as the machine-made link is bent cold around less than twice its own diameter at a high speed on an elliptical mandrel. This sets up severe initial internal stresses in tension and compression in the outer and inner fiber of the link respectively, which is sure to cause a weakened condition, while in the hand-made link this bending is made under a cherry red heat and obviates such stresses; also a far better lap weld is secured in a hand-made link.

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4. Number each chain and keep a record of when it goes into service and length of service and class of work it is used for. Inspection should be made daily by a competent and experienced person to detect any reduction of section due to wear, deformation of links and any visible flaws developed in the welds. This is somewhat tedious and expensive, but must be done and done carefully to insure safe operation. In case a chain has been fatigued due to having been overloaded, it requires an experienced man to detect it and then it is only possible to catch a small percentage of such cases. A fatigued link has a characteristic metallic ring when struck a sharp blow with a hammer, while a good piece of Norway iron has a decided dull sound when so struck. The writer has found that links so detected by a metallic ring can be further tested by placing the link edgewise on an anvil and striking it several sharp blows with a sledge. If it is fatigued it will break with a decided crystalline fracture.

5. Special attention should be given to the design of the ring that connects the chain to the block hook. This ring should be designed to withstand the same load as the chain, using the regular formula for a circular ring under tension in a diametral line. The maximum stress in a ring is found by solving for the maximum moment, which is at the points of application of the load.

$$M \text{ (max.)} = 0.318\ P\ D$$

Where P = the load, and D = mean radius of the ring.

If we equate this value of M to the resisting moment of the section we get:

$$0.318\ P\ D = .0982\ f\ d^3$$

$$\text{or, } P = \frac{0.617\ f\ d^3}{D}$$

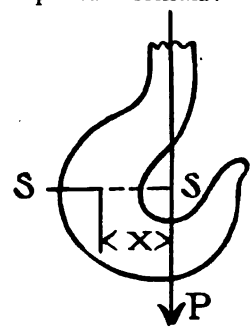
Where f = extreme fiber stress, and d = diameter of the section of the ring.

The writer has found many chain rings, which upon investigation by the above formula, have proven to have a far lower safe load than the links.

6. It is advisable to check up the size of the hook, as the writer has found the usual practice of designing a hook is to use the following empirical formula:

$$f = \frac{P}{A} + \frac{Px}{S}$$

Where S = area of critical section SS



This formula is in error in that the second term represents the bending stress calculated from the formula used for straight beams, which however does not apply to curved pieces, and the formula given above is not even approximately correct. The correct stress caused by the bending moment can be solved by consulting any standard work on strength of material.

The writer has also found many operations where it is necessary to suspend the load on the point of the hook. If there is any possibility of such practice, the hook should be designed accordingly, otherwise the stresses produced will be dangerous.

7. The last but most important recommendation is: To subject the chains to a proper load and as an additional safety precaution, anneal them before they are put in service. This annealing though will not prevent fatigue of the metal in case the chains are overloaded, but will merely soften the chains so they will pull to a lock and serve as a telltale for overloading.

It is obvious from the foregoing discussion on the causes of fatigue that annealing at regular intervals is entirely unnecessary, as, if there is any benefit from annealing at all, it will be merely to toughen the metal, and, therefore, is necessary only once.

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Safeguarding Air Compressors

By W. P. Eales

Supervising Inspector, The Travelers Insurance Company

Proceedings of the Fourth Annual Safety Congress, National Safety Council.

WHEN the committee assigned to me the subject of Safeguards for Air Compressors for discussion, I examined our records to learn the number, character, frequency and causes of accidents attributed to this particular kind of equipment. It was apparent at once that serious accidents involving permanent disability exceed in number the trivial and minor accidents, and in this respect our experience is directly opposite to that encountered with steam engines and other generating apparatus. While these serious accidents are rather infrequent, they occur with sufficient regularity to merit earnest attention.

The unsatisfactory performance of air compressors, and the hazard to those who operate them, are influenced by several factors and conditions. The main contributing causes are insufficient capacity, improper installation, unfavorable operating conditions, and negligent operation and maintenance.

The equipment must be adequate in size, and of proper design to deliver at normal speed the desired air volume and pressure.

Any speed in excess of 500 feet of piston travel per minute should not be considered in accepting new installations. If the desired pressure at the point of delivery cannot be maintained without exceeding this speed, it is an indication of leaky valves or connections, or it shows that the compressor is too small for the requirements. Another feature that must be considered in connection with crank- and flywheel air compressors is the rim speed of the flywheels. Under the most favorable operating conditions, the peripheral speed of solid cast-iron flywheels should not exceed 5,000 feet per minute; and when a wheel is "built up," or composed of parts that are joined together by bolts or in other ways, the maximum allowable speed should be determined with due reference to the construction of the wheel. A light wheel with flanged joints in the rim, for example, should not be run at a peripheral speed exceeding 3,000 feet per minute. Where the duty of a compressor is subject to frequent and sudden changes the flywheel strain is unusually severe, and special allowance should be made in such a case, in designing the wheel.

Air compressors should be erected and installed where the air is clean, cool and free from dust and grit; and the power room or portion of the plant containing the compressor should be paved or floored so that it may be kept clean and free from dust. This precaution should be taken before the compressor is put in commission. It is not essential that it be located in a detached building, but when it is adjacent to a crusher building, or to a boiler room or any other department where dust is formed, the compressor room should be made dustproof.

When the compressors run continuously, or when the duty required of them is severe, it is vitally important to provide an adequate and unfailing supply of cooling water for the jacketed cylinders, cylinder heads and intercoolers. If the supply of cooling water is limited, or if it is of doubtful quality (containing lime or mud, for example), it will pay at the time of installation to make special arrangements to secure a better supply, or to purify the supply that is already at hand. Impure water, and consequent deposits upon the interior cooling surfaces of the water jackets, often lead to overheating and cause difficulty and trouble. All overflow water from the cooling system should be piped in such a manner that it will be plainly visible to the attendant.

Direct-acting or straight-line types of compressors, with Corliss or other positive-motion suction and discharge valves,

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are best where the operating conditions are unfavorable, and where the skill and proficiency of operatives are uncertain.

Air compressors have extremely variable loads, as a rule, and it is important that the foundations and fastenings be designed to take care of the fluctuation and prevent shock and vibration due to sudden stopping and starting when the pressure attains or falls below the normal at which the regulating device is adjusted. Pipe lines should be free from sharp turns and angles, and should be arranged and secured so as to avoid excessive pulsation and vibration. Discharge pipes near the compressor should be covered or insulated, where exposed or easily accessible to the attendants. Provision should be made for the free expansion and contraction of the piping, because in some air lines the range in temperature is fully as great as in a steam line. The theoretical temperature of air that has been compressed suddenly and without loss of heat, from atmospheric pressure at 60 degrees Fahrenheit to a gage pressure of 100 pounds per square inch, is about 480 degrees Fahrenheit, or approximately 150 degrees higher than the temperature of saturated steam at a corresponding pressure. Therefore greater vigilance, care and attention are necessary.

Air tanks or receivers should be built of boiler plate of known physical qualities, and in accordance with boiler specifications. All openings for threaded pipes and connections should be reinforced, if necessary, to provide full threads. A spring pop safety valve with full-size connection should be attached direct to the tank, and set to release at a pressure not exceeding the safe working pressure of the tank, using a safety factor of at least five. Air tanks should be placed so that all their external surfaces can easily be exposed for examination. They should never be put underground, nor in other inaccessible places. Manholes should be provided in all tanks that are more than 36 inches in diameter, and handholes as a means of access to the interior should be provided in smaller tanks, so that the inspector can examine the interior in all cases. Every tank should also be fitted at its lowest point with a drain pipe not less than an inch in diameter, to carry off water and oil.

Stop valves in delivery lines should be omitted so far as possible. If stop valves cannot be avoided (which is sometimes the case where there is more than one compressor) they should be of gate or straight-way types. Globe valves should never be used in discharge lines. A spring pop safety valve, of sufficient area to release under an overload of 50 per cent, should be provided between the compressor and the stop valve.

Compressed air is properly regarded as a fairly safe power in comparison with steam or electricity, and yet there is an explosive hazard involved that is not very generally appreciated, and to guard against this, particular attention must be given to the internal lubrication of the cylinders and to the circulation and temperature of the cooling water. Steam cylinder oil should never be used in air cylinders. There is an intense dry heat in air cylinders, while in steam cylinders moisture is usually present to some extent. Oil will adhere to a dry surface when it would wash off of a similar surface that is moist or damp; and for this reason a smaller quantity of oil is sufficient in an air-compressor cylinder. A pint of air-cylinder oil should be ample for a 12-inch cylinder for twenty-four hours' running. It is sometimes difficult to adjust a gravity lubricator to this fineness of feed, and hence for this purpose forced-feed mechanical lubricators are recommended. There is danger in using too much oil in air cylinders. At a pressure of 100 pounds the temperature in an air cylinder often reaches 400 degrees, on account of interruption in the circulation of the cooling water; and, owing to the likelihood of exposure to this intense heat, the cylinder oil must be of such a nature that it will not volatilize, nor form a coating of carbon or burnt oil around the discharge valves and render them inoperative. This condition is encountered in small compressors, the discharge valves of which are actuated by springs only. The carbonized matter in the cylinder oil, liberated by the application of heat and deposited in the air passages and in and around the valves, may be removed quite well by the

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application of soap suds or soapy water. Kerosene oil should never be used for this purpose. It becomes necessary in some cases to remove the valve bonnets once a week, to clean out the ports and passages.

In some installations fusible plugs are provided in the bonnets or parts adjacent to the discharge valves, to relieve the pressure in case the temperature reaches 500 degrees, the danger point. This is a wise precaution, and plugs of this kind should be adopted more generally.

Self oilers are advisable for the external working parts of air compressors. They are efficient and economical.

All flywheels, rods, cranks, yokes, belts and other moving parts should be effectively guarded. For this purpose an iron or wooden railing, 3½ feet high, is sufficient, if it is of a permanent and substantial character, and placed so that there is a clearance of at least 15 inches between the railing and the moving part that is to be protected. If a clearance of this width cannot be had, the inclosures should extend to a height of at least 6 feet, and be filled in with a substantial wire-mesh screen.

Safety Lighting Systems

"A CODE of Lighting for Factories, Mills and Other Work Places," by C. E. Clewell, Assistant Professor of Electrical Engineering, University of Pennsylvania, is the title of an instructive and exhaustive paper on lighting, natural and artificial.

Professor Clewell urges auxiliary lighting, with which many accidents will be avoided. The necessity of proper illumination and protective eye glasses is also insisted upon. The paper was read at a joint meeting of the Philadelphia Section of the American Institute of Electrical Engineers with the Illuminating Engineers Society, at the Engineers' Club, Philadelphia, November 8, 1915.

T. J. Little, Jr., engineer, and a member of the Illuminating Engineers Society, commented on Professor Clewell's paper as follows:

"This is one of the most important subjects taken up during the past year by the Engineering Society and, no doubt, marks a new era in engineering circles, in that it directly concerns mechanical and electrical engineers and architects, bringing them shoulder to shoulder with the illuminating engineer, whose profession is growing so rapidly in importance.

"In reviewing the code, I am interested in Article 11, regarding auxiliary lighting, in which reference is made to the desirability of providing a dual system of lighting. There will be much debate on the desirability of such an arrangement, but we have to consider this matter in a broad-minded fashion. There is no such thing as perfection in any lighting system, and in places where large numbers of people congregate or are employed, extra precaution should be taken to see that the lighting system is so arranged that there can be no general outage, which is apt to result in a panic.

"Great strides have been made in the 'Safety First' propaganda. We have succeeded in reducing accidental injuries in great industrial plants to a surprisingly low figure and it has not necessarily been accomplished by interfering with the general operation of the plant or with efficient operation.

"We have shown conclusively that better work can be produced where ample illumination is provided. We have tried to guard against eye-strain, but we surely have not paid sufficient attention to auxiliary lighting. There are certain great corporations which recognize the importance of this matter and have already provided both gas and electric light systems to be operated simultaneously, so if one should fail, the other will contribute sufficient illumination to prevent any possibility of panic.

"There are department stores which have also considered this matter and have provided standardized fixtures in which gas lamps are used in one bay and electric lights in the adjoining bay, and the layman would never suspect that different systems of lighting were used."

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EDITORIAL

Automatic Sprinklers and the Public

THE fire tragedies in Brooklyn and Pittsburgh factories and in the school at Peabody, Mass., furnish powerful arguments for the installation of automatic sprinklers to save lives. Indeed, at an early moment, thousands of sprinkler installations should be made in factories, schools, hotels, theaters, institutional buildings and mercantile establishments. SAFETY ENGINEERING is a strong believer in the value of automatic sprinklers and regrets that there should be any obstacle to their immediate general adoption.

A question, however, has arisen recently—forced upon public attention *because public officials are clothed now with authority of law to compel property owners to equip their premises with sprinklers.* The question is whether official mandates to install sprinklers in order that lives may be saved should be the means of turning large profits into the treasuries of automatic sprinkler companies. In other words, should a public necessity afford a money making opportunity for corporations that market sprinkler heads and other sprinkler specialties at prices which, perhaps, might be considerably reduced without depriving the sprinkler manufacturers of a reasonable profit? Can municipal officers who order the installation of sprinklers—or even the manufacturers of sprinkler heads and their accessories, themselves—show that the prices now charged for sprinkler products are justified by the labor and material required to manufacture the products? Can the sprinkler manufacturers or anybody else show that the prices of sprinkler heads, for example, are determined by competition in an open market? The following quotations on brass and bronze pipe fittings and specialties are of interest as showing certain comparative net prices:

DEVICE.	Weight each. Ounces.	Net price each.	Net price per pound.
Bronze sprinkler heads (½" pipe)	4 to 6	$.50 to .75	$1.30 to $3.00
Brass globe valves (8/8" pipe)	10 to 12	.30 to .60	.48 to .80
Brass steam cocks (½" pipe)	7	.25	.57
Brass unions (1" pipe)	18	.47½	.42

Apparently similar processes are used to manufacture all of the above devices. They are all used in large quantities and in some cases distributed through the same channels. What, therefore, is the cause of the discrepancies in the analyzed prices per pound?

If automatic sprinklers are to become a public utility, they should be obtainable at public utility prices. If they are to be protected as patented articles, by the concerns that manufacture them, with limitations on their general manufacture that allow unusual profits to the industry, can the lawmakers equitably make a law which throws great wealth to the industry at the expense of individual property owners? Freight rates and insurance rates are supervised by branches

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of the government to insure prices that represent intrinsic value plus reasonable profit. Will the prices of automatic sprinklers stand quantitative and qualitative analyses, in the interest of a square deal to the public?

It is claimed in the advertisements of automatic sprinkler companies that sprinklers "cost nothing," because in a period of from five years to seven years an installation will be paid for by the saving in fire insurance rates. But why mortgage a property owner to an "equipment company" for seven years if the difference in insurance rates, on the basis of fair prices to the property owner, would pay for a sprinkler installation in two or three years?

What is the answer?

Educate the People Through Expositions

ATTENTION is called repeatedly to the sacrifice of life, limb and property by accidents and fires. Slowly but surely the country is beginning to grasp the enormity of the wastage that accidents and fires claim each year, 60 per cent of which is preventable. Not until the public has become educated in the benefits of accident prevention and fire prevention can we expect to enlist its interest and support. Public interest is needed in every section of the country if the accident preventionist and the fire preventionist are to realize their ambition to reduce the drain on the nation. Associations, such as the National Fire Protection Association and the National Safety Council, are doing splendid work in holding conventions each year and in gathering together men, engaged in the fields of fire prevention and accident prevention, for the purpose of discussing and formulating plans for furthering the work in which they are engaged.

Today accident prevention and fire prevention proceed along systematic and scientific lines. Principles which have been proven through experience to be correct govern the work of the accident preventionist and the fire preventionist. Rules and regulations indicate the most approved methods for meeting and removing hazardous conditions to life and property.

In order to secure the interest and the support of the largest number of citizens in the work of conserving life and property against fire and accident, it is essential that the public be informed of at least the fundamentals of accident and fire prevention, and no opportunity should be overlooked for providing a representative exhibit of the products, devices, apparatus and equipment necessary to secure conditions of safety against accidents and fire destruction.

SAFETY ENGINEERING offers the suggestion that a great opportunity is afforded each year, at the times of the conventions of the National Fire Protection Association and the National Safety Council, for holding such exhibits in their respective fields. The conventions are attended by men engaged in the work of protecting life and property against damage, but the opportunity is not now offered at these gatherings for the public, and "The Man On The Job," to see approved types of safety devices. Why not hold, in the cities in which these conventions are held, at the time of the conventions, a representative exposition displaying necessary devices, equipment, etc., under the auspices of the association in session, and thus furnish an opportunity for citizens to attend the expositions and obtain an intelligent, practical idea of the latest means and methods for preventing accidents and fires, as employed in this country? Such information would arouse interest and secure co-operation. And it should be borne in mind that without the co-operation of the laymen the nation cannot reduce its enormous yearly losses of life and property to anything like the figure that is possible with a universal co-operation.

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The So-called Fire Escape

By Louis H. Schene

This article has been prepared to show the existing lack of adequate and safe means of escape in case of fire. The next issue of this magazine will contain an article embodying constructive suggestions on adequate fire-exits.

"THE fire-escape was rendered impassable by smoke and flame from adjacent windows and the occupants of this floor jumped to the street below or turned back to meet their death within."

How often has the above statement, in one form or another, appeared in newspapers in every section of the country! Fires involving terrible loss of life occur periodically year after year; the Collinwood school disaster, the Newark factory fire, the Binghamton mill fire, the Triangle Shirt-waist fire, the more recent Brooklyn fires and many others throughout the length and breadth of the land have shocked us momentarily, but only momentarily. We have wept at the funerals of the unfortunate victims, we have cursed those who were responsible, we have read with sympathy the lengthy editorials in the daily papers, and we have settled back with forgetfulness and complacency into the routine of business life. Instead of stopping for a moment to realize our great civic responsibility, we hasten to our work daily in the midst of conditions which at any moment may combine to make us the victims of another catastrophe. The legislators have given scant attention to the passing of laws tending to eliminate this ever present danger, and officials, as a rule, give less attention to rigid enforcement of such inadequate laws as do exist; the owners of buildings have grudgingly complied with these laws in the cheapest possible way; and the rest of us accept these conditions without protest or complaint. This general feeling of security grows from just one misconception—the idea that any exterior structure of iron

Fig. 1

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leading to the ground insures the safety of the occupants of a building.

The author has selected at random, examples of so-called fire escapes which are permitted to exist on three distinct types of building. The accompanying photographs are not isolated cases but are typical of the sadly inadequate means of escape found on these classes of buildings in every section of New York City. The three classes of buildings are, the apartment house (classified as tenement in the building code), the factory, and the office or loft building. These three classes of buildings in particular, because of the great number of their occupants and their height, present the greatest hazard and demand the most careful consideration of fire exit facilities.

Figure 1 shows the rear elevation of a typical moderate-priced six-story apartment house. A series of gridiron balconies connected by vertical iron rung ladders provide the means of exit from the upper stories to the ground. One window opens on each balcony and the ladder-opening in the balcony floor extends half way across under the window opening and is without an enclosing rail. Between the wall of the building and the ladder opening there is, at most, twelve inches of balcony floor. Windows are glazed with plain glass in wooden sash.

Let us suppose that a fire breaks out in any of the lower floors. It is fair to assume that the balconies and ladders would be rendered impassable by smoke and flames pouring from the windows on and adjacent to the balconies. If, however, the fire was confined to the opposite side of the building, permitting egress to the balconies, even then the difficulties in the way of reaching the ground safely by means of the fire escape, would be well-nigh insurmountable. An able-bodied man with steady nerves and a reasonable amount of time would have a fair chance of escaping. A group of people composed partially of women, excited and impeded by their skirts and often small children, would have almost none. It would be necessary for them to get safely from the window to the platform around the unguarded ladder opening, then reach the ladder without falling through the opening and finally to climb safely down from twelve to sixty feet of narrow vertical iron ladder to the ground. Many other unfavorable conditions may arise to render safe exit by this means even more

Fig. 2

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impossible; dizziness in the daylight and uncertainty in the darkness; obstructions of various kinds on the balconies, including awnings over the windows; ice or snow on the iron work of both balconies and ladders; a severe rain storm or wind storm; any one or all of these hazards may obtain to turn this so-called fire escape into a death trap.

Figure 2 shows the fire escape on the street elevation of a large piano factory. Paint, wood varnish and other highly combustible materials form a large part of the contents. This escape consists of a series of gridiron balconies connected with stairs having gridiron treads and a hand rail and the ground is reached from the second floor by a counterweighted iron stairway. These balconies extend across two windows and have a railing around the outside of the platform, but the stair opening is again unguarded. Neither the windows opening on the balconies nor the windows adjacent to them are protected by wire glass.

A fire in this building, because of the nature of its contents would be likely to originate in, or cause, an explosion and at best it would spread with lightning rapidity. Unless an automatic sprinkler system successfully coped with a fire of such intensity, panic would surely ensue. Even though flames did not break out from windows beneath or adjacent to the fire-escape and render it untenable, an alarm of fire would mean that an hysterical crowd would jam the platforms and stairs to, and perhaps more than, their capacity. In the course of their descent the occupants must pass, at every floor level, along a narrow ledge of gridiron floor, past the unguarded stair opening.

Figure 3 represents a type of fire-escape known as the straight run. In this particular case, it is installed on a factory building but it is also in common use on theaters. The misuse of this type of escape lies in permitting unprotected window and door openings at any point beneath or adjacent to it. A lasting memorial to this misuse is the Iroquois Theater disaster where hundreds of women and children were prevented from using an otherwise excellent fire-escape by flames issuing from unprotected openings beneath, and as a result, scores were burned to death.

Fig. 3

Two especially bad features stand out on the fire escape shown in this illustration. Although the stairs have flat grid-

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iron treads, their angle of descent is so steep that they are to all intents and purposes ladders, and it would be practically impossible for any one to descend facing forward. In the second place, there are unprotected windows both adjacent to and beneath the stairs and platforms, thereby exposing the occupants to the same peril as exists in the fire escapes shown in figures 1 and 2.

In figure 4 there is shown a fire escape of the same general character as that shown in figure 2. In one respect, it would be a safer means of exit, since all windows opening on the balconies and underneath the balconies are glazed with wire glass in metal sash. Several other bad features, however, nullify the advantage gained by this form of protection. The stairs are so steep as to be virtually ladders. The ladder openings in the grid platforms are unguarded and there are windows glazed with common glass within 3 feet of either end of the iron platform. The most flagrant violation of safety principles is, however, the mistake of having the fire escape lead to the roof of a combustible structure at least 8 feet above the ground. The presence of fires in this structure would render escape from this end of the building utterly impossible. Under the most favorable conditions possible, even if the occupants of the building survived the peril of their descent to the roof of this shed, ladders or some other means of descent would still be necessary to convey them to absolute safety.

Fig. 4

In figure 5 is shown a modern type of high loft building, with outside exit stairway. The fire escape in this case was not an afterthought nor an addition to a building already in existence, but was studied in conjunction with, and at the same time, as the general plan of the building as a whole. At first glance, it would seem that this exit stairway is as safe as an outside exit stairway could possibly be made; upon examination, however, it will be seen that the exit doors of each landing open outward in the face of any one descending from the floor above. Windows which are evidently left open all or a part of the time are situated in close proximity to the stairs at every floor. Some of the exit doors, all of which should be always closed, are seen to be tied open. An open door on the floor in which a fire breaks out provides a flue for smoke and flames and would probably render useless the

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stairs above it. Moreover, the stairway is directly exposed to a fire which might break out in an old and combustible building placed directly against it. Attention is also called to the long handled mop which is seen obstructing one of the landings. While this may seem an insignificant obstruction, it might nevertheless prove fatal in a sudden rush of people on the stairway.

Fig. 5

The above cited cases of inadequate fire exits are neither unusually bad nor are they the most flagrant violations of safety principles to be found in New York City. The author has purposely refrained from selecting for this article the worst examples of this form of danger in order to show the prevalence of this peril in good types of buildings owned and occupied by intelligent people. Conditions of the usual types of tenement houses and the cheaper mills and factories are vastly worse because the owners, for the most part, are avaricious and the occupants ignorant.

The building code of the City of New York contains the following blanket regulations for fire escapes: All buildings, except one and two family houses and office buildings under 5 stories in height, "shall be provided with such good and sufficient fire escapes, stairways or other means of egress in case of fire as shall be directed by the Department of Buildings; and said department shall have full and exclusive power and authority within said city to direct fire escapes . . . . to be provided upon and within said building or any of them."

This regulation compels no building owner to provide wire glass windows, solid platforms, easy stairs or any other features necessary to an adequate fire escape. The law itself means nothing except as it is interpreted by the Building Department.

Under these inadequate laws, the only chance for improving conditions generally is the realization by the owner of his individual responsibility for the safety of his tenants. If the building code permits a man to equip his building with cheap and inadequate fire exits he must go beyond the building code. He must satisfy himself that his tenants are safe; he must provide safety for others at least as carefully as he would provide it for himself and his family. Only the prevalence of such an attitude will accomplish permanent good in bringing about better legislation, resulting in the guarding of human life against the perils from fire.

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How to Educate the Workman

General Round Table Discussion at the Fourth Annual Safety Congress of the National Safety Council

Proceedings of the Fourth Annual Congress, National Safety Council.

THE General Round Table discussion at the Fourth Annual Safety Congress of the National Safety Council was held in the Bellevue-Stratford hotel, Philadelphia, on Thursday afternoon, October 21, 1915, with C. W. Price, Assistant to the Industrial Commission of Wisconsin, acting as Chairman.

The subject was "How to Educate the Workman"; and the following named gentlemen took part in the discussion:

S. W. Ash, General Electric Company, Pittsfield, Mass.

H. J. Bell, Safety Inspector, Chicago & North Western Railway Co., Chicago.

C. M. Brading, Safety Inspector, Wisconsin Steel Company, South Chicago.

H. A. Bullock, Executive Staff Assistant, Brooklyn Rapid Transit Company, Brooklyn.

K. M. Burr, Safety Inspector, Illinois Steel Company, Gary, Ind.

Mrs. Lillian Burt, American Issue Publishing Company, Columbus, O.

St. Clair B. Byrne, Chairman, Central Safety Committee, The Texas Company, Houston, Texas.

W. H. Cameron, Secretary, National Safety Council, Chicago.

B. W. Conlin, National Malleable Castings Company, Chicago,

L. A. DeBlois, E. I. du Pont de Nemours Powder Company, Wilmington, Del.

E. C. DeKay, Recorder, State of New York Insurance Department, New York City.

J. M. Eaton, Manager, Welfare Department, Cadillac Motor Car Company, Detroit.

G. T. Fonda, Safety Engineer, Bethlehem Steel Company, South Bethlehem, Pa.

H. W. Forster, Chief Engineer, Independence Inspection Bureau, Philadelphia.

H. L. Gannett, Inspector of Safety and Fire Prevention, Commonwealth Edison Company, Chicago.

Walter Greenwood, Safety Inspector, Carnegie Steel Company, Youngstown, Ohio.

W. T. Hannigan, Secretary, Employes Benefit Fund Committee, New England Telephone and Telegraph Company, Boston.

F. H. Hanson, New York Central Lines, Cleveland.

H. B. Harmer, Claim Agent, Philadelphia Electric Company, Philadelphia.

J. D. James, Safety Inspector, New Jersey Zinc Company, Palmerton, Pa.

A. T. Morey, Assistant to the President, Commonwealth Steel Company, Granite City, Ill.

E. B. Morgan, Safety Engineer, Commonwealth Steel Company, Granite City, Ill.

L. R. Palmer, Chief Inspector, Department of Labor and Industry, Harrisburg, Pa.

Dr. F. D. Patterson, Director Department of Sanitation and Accident Prevention, Harrison Bros. & Co., Inc., Philadelphia.

J. A. Robertson, Chairman Committee of Safety, Eastman Kodak Company, Rochester, N. Y.

J. S. Rockwell, General Agent, Buffalo, Rochester & Pittsburg Railway Company, Rochester, N. Y.

Dr. Ben. L. Reitman, Propagandist of the Jewish Labor Group, Chicago.

John Schilling, Jr., Safety Inspector, Wm. Cramp & Sons Ship and Engine Building Company, Philadelphia.

F. W. Shepard, Safety Inspector, American Cast Iron Pipe Company, Birmingham.

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MRS. NELLIE SLAYBACK, New Jersey State Department of Labor, Montclair, N. J.

H. B. SMITH, Supervisor of Safety and Labor, Illinois Steel Company, Joliet, Ill.

J. C. SMITH, Safety Inspector, Inland Steel Company, Indiana Harbor, Ind.

E. M. SWITZER, Superintendent of Safety, Chicago, Burlington & Quincy Railroad, Chicago.

S. W. TENER, Manager, Accident and Pension Department, American Steel & Wire Company, Cleveland.

B. F. TILLSON, New Jersey Zinc Company, Franklin Furnace, N. J.

E. B. TOLSTED, Department Engineer, Independence Inspection Bureau, Philadelphia.

H. B. VINCENT, Day & Zimmerman, Philadelphia.

CHAIRMAN: Experience in safety work has demonstrated absolutely that 75 per cent of deaths through industrial accidents may be prevented. Such experience has also proved that one-third of the accident prevention problem is involved in mechanical safeguarding, and two-thirds in so interesting and educating the workman that one not only secures his hearty co-operation, but leads him to realize that safety work touches him more closely than it does the employer. I do not believe that any safety man here today will gainsay the truth of these statements. So I am probably safe in saying that the subject for the Round Table discussions this afternoon is the most important topic of the Congress. When allocating the chairmanship of the discussion to me, our Executive Committee indicated that probably one-half of those present at the meeting would either not be familiar with the details of what we safety men call a "Safety Organization," or would not have had sufficient experience in educational work to be really convinced of its practical character and value. For these reasons the discussion which is to follow is intended primarily for that group. We hope, of course, that the talks will interest the remainder, and that they will help matters along. We shall commence at the beginning: just as if you had never heard of a safety organization; and the whole ground will be covered. Anyone may speak. The meeting is quite informal, and we wish plenty of questions. Secretary Cameron will now read the National Safety Council bulletin, "How to Start a Safety Campaign"; and afterwards H. A. Bullock, of the Brooklyn Rapid Transit Company, will criticize that outline.

SECRETARY CAMERON: The bulletin reads thus:

HOW TO START A SAFETY CAMPAIGN,—The following suggestions are addressed to the factory manager who has become convinced that safety is an indispensable part of an efficient factory organization, and wants to organize his plant so as to secure the co-operation of his foremen and workmen in preventing accidents.

1. Call your superintendents and foremen together, and tell them plainly what you have in mind. Lay before them the experience of other companies in reducing accidents and outline the methods adopted. (Ask N. S. C. for details.) Agree on a definite program, and make a written outline of the items in the order in which they are to be taken up; the more serious points of danger, of course, should be covered first.

2. Remember the company must show by visible and tangible signs that it means business and will do its part, before it can go to the workmen and ask them co-operate; therefore the first thing to do is to build safeguards and cover the more serious points of danger.

3. Some one person should be selected to give a part or all of his time, depending on the size of the plant, to the work of looking after the details of safety. He should be known as the safety inspector.

4. During the first six months have regular and frequent meetings of the superintendents and foremen for the purpose of reporting progress, exchanging suggestions and fostering interest and enthusiasm.

5. After considerable guard building has been done, and you have succeeded in getting your superintendents and foremen lined up and interested, then call a meeting of all of your employes. The manager should preside at this meeting, and should lay before the men the facts as to the causes of accidents, the large percentage of which cannot be prevented by guards, and the part which the workmen must do. He should frankly state that in the past the company has been negligent, and accidents have happened which might have been prevented had proper guards been provided. He should also state with equal frankness that many men have been injured because they were careless and thoughtless. He should say that now a new leaf is to be turned over, and the company will go to the limit and will build any guard which is practical, and urge the

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men to co-operate and all pull together for a safe shop. The superintendent and some of the foremen should also speak at this meeting. If it is possible, have your doctor speak on first aid and the importance of reporting slight injuries.

6. At this meeting appoint a workmen's inspection committee and outline its duties. Make it plain that the members of this committee are to have absolute liberty to make any inspection they wish, and to offer as many suggestions as possible—the more the better. Urge every employe to report suggestions to the committee.

7. Select a safety motto for the shop, such as:

"Be Careful." "A Safe Shop."
"No Accidents." "Boost for Safety."
"Stop Accidents." "Safety First."

8. Place bulletin boards in each department and post on them such materials as the following:

a. The motto of the shop in large letters.
b. Pictures of injured men with stories of the accidents.
c. Newspaper clippings of accidents.
d. Copy of suggestions made by workmen's committee.
e. Analysis of accidents showing causes.
f. Monthly report of accident records in the various departments.
g. National Safety Council bulletins.

9. Remember that the secret of a successful campaign is to grip the proposition just as you would a new piece of work in the manufacturing end of your business. Convince every foreman that the company is determined to eliminate accidents, and give them to understand that they are expected to do their part. Be absolutely frank with your workmen, and make them feel that you are going to recognize them; give them a large part in the work, and let them know that you will welcome any suggestions.

A safety campaign should start off with vim; the men should be made to feel that a new leaf has been turned over and everybody is to take a new start; a sort of "all pull together" spirit should be fostered. An enthusiastic start will do more to jar the men loose and awaken interest than months of humdrum plodding effort. One manager who reduced accidents 50 per cent the first year was asked how he did it. He replied: "I made a noise, and I kept right on making a noise until every man in the shop got to thinking about safety."

Note: Other activities which will be helpful:

a. Start a safety campaign in the schools. The children will carry the message home and help to increase the interest of the parents.
b. Ask the ministers to conduct a safety Sunday.
3. Secure publicity in the local papers.
d. Have moving picture films run in the local theaters showing such films as "The Workman's Lesson," etc. Write National Safety Council headquarters for list of available films.

H. A. BULLOCK: I cannot criticize the wholly admirable outline of a standard safety organization just given by Mr. Cameron. The methods of procedure which he has described and the principles upon which those methods rest are directly in accord with the principles which our observation of safety work throughout the country and our experience in our own corporation have led us to believe were the correct principles to follow.

We must understand that any such organization must be adapted to local conditions and that details which, as just outlined by Mr. Cameron, may seem to some of us to concern primarily a manufacturing plant, should be modified or adjusted to meet other needs if we are dealing with a railroad or other public utility corporation. There are, however, common elements underlying all work of this kind, and I shall endeavor to point out some of the elements that we all have to meet in systematic safety work in whatever industry we may be engaged.

The first thing to do is to create the proper environment in which to conduct your safety education. We are dealing primarily with a question of psychology. We are trying to make an effect on somebody else's mind. And although we might laugh at ourselves if we looked in a glass and said, "You are a psychologist," nevertheless as a matter of fact we are—everyone of us—and that means that we have got to consider every condition which affects the minds of the men in whom we want to implant this idea of "Safety First."

We must go a long way back of the individual employe and get at the heads of the business. As Mr. Cameron well said, the management must emphasize the necessity of "Safety First" by some demonstration of the fact that it backs the safety program to the limit. We must do away with what (to borrow the parlance of liability law) we might call the three "constitutional" excuses of the man who is against safety organization. These are, first, that the adoption of safeguards will tend to make courts and juries more exacting in damage cases; second, that if safeguarding of a plant is begun there will be no limit to the ex-

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pense involved and that the concern cannot afford to stand such expense; and third, that it is cheaper to take chances than it is to be safe. These three "constitutional" excuses are much like the three old common law defences in liability litigation, and they have got to be eliminated just as much as the fellow servant rule, the doctrine of assumption of risk and the doctrine of contributory negligence had to be eliminated in working out our proper compensation act. And such elimination will do more to start the management right and to create the right atmosphere than any other initial step I can think of.

In the second place, we have got to get to the foremen and superintendents and show them that what we are suggesting is not in any sense a personal criticism, but is a helpful activity of which those in directive position will be the first beneficiaries. We must explain to them that when a new method of interesting men in the subject of their safety (and consequently their efficiency) is introduced, supplementing previous endeavors which have been restricted primarily to the making and partial enforcement by discipline of certain rules, these new methods are no more a reflection upon the efforts that have preceded than was the substitution of steel axles for cast iron axles on railroad cars a reflection upon the efforts of railroad engineers before the process of making steel had reached the present-day development.

Next we must attend to the matter of physical protection of the plant. While we may say that 65 per cent to 85 per cent of accidents are due to individual carelessness, it is not true that the element of physical protection of equipment amounts to only 15 per cent or 35 per cent of our safety program. Proper physical protection of plant is at least 50 per cent of the battle and at the start it approaches close to 100 per cent because you cannot convince employes that the management means what it says in the matter of safety if the management leaves employes to work among conditions that it knows to be unsafe without making every reasonable effort at protecting them. The absence of proper lighting, for example, which may produce very serious accidents in certain plants, is an example of the direct result of failure to protect physical conditions. The indirect effect of such failure upon the minds of employes with whom we have to deal is still more important.

Now when we have educated the management and safeguarded the plant, we are ready for educational methods directed at the individual employe.

I have very little comment to make upon the admirable outline of such methods of education just presented by Mr. Cameron. A proper explanation of the plan at the outset is absolutely essential. I know of no better material for such explanation and for subsequent educational work than that which has been supplied by the National Safety Council and is being used more and more generally throughout the country.

I am convinced (and I have verified this conviction by correspondence with several hundred other men engaged in safety work) that the participation of the rank and file of the men on safety committees and, so far as possible, the selection of these representatives by the general force of employes in their respective departments is a valuable and almost vital element in successful safety organization.

The participation of the men in actual safety inspection and all other details of the work carried on by the safety organization, is, in my judgment, also essential. We do not want employes to feel that the safety inspector or the safety committee is a committee which exists only for the purpose of going around criticizing. We must, if we are to succeed, establish the feeling that the safety committee is a co-operative institution through which the man who operates the machine or the street car, and the foreman, and the superintendent, and the manager, and the president, and the directors, and the stockholders, are all striving to make the industry safer.

Intimate relations between the men and the management are, of course, most helpful. Meetings at which representatives of the management appear go far, in my judgment, to promote such intimacy. Employers' publications are ex-

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cellent media for safety education and safety may be impressed even in the routine correspondence of a company by the use of safety devices or slogans on stationery, stock forms, etc.

Finally, Mr. Chairman, I suggest the co-ordination, so far as possible, of instruction and disciplinary machinery with our safety work. I do not mean that the safety man is going to supplant the operating superintendent or foreman. But where, as with a railroad, it is necessary to maintain an instruction school, or where, as in a large manufacturing plant, an apprenticeship system obtains, it is possible to strongly emphasize the relation of man's safety duties to his ultimate success in filling his job. Similarly, discipline may be so shaped as to correct through education, as well as to warn through penalty, and as soon as the educational idea is introduced into discipline the opportunity for safety training is immediately presented. It will, in my judgment, surprise most people who have not tried it, when they find how quickly safety teaching may, without any undue disturbance of operating conditions, be implanted in the instruction and disciplinary machinery of their organization.

You will see from what I have said that we are dealing with the entire chain of circumstances which surrounds the employe in his relation to his job. What is commonly known as welfare work—questions of sanitation and other physical conditions surrounding employment—involves almost every factor in industry, but the elements which I have discussed are, I think, those most closely related to the program which the National Safety Council has laid down and because I believe that these are essential elements I am strongly in favor of the general method of organization that Mr. Cameron has outlined.

CHAIRMAN: Would anyone like to ask questions now? Be frank and free. Tell your own troubles and experiences.

F. W. SHEPARD: The first statement in the bulletin says that you must interest the management. At our plant of 1,000 men, we have been carrying on safety work for three years; and I find that the greatest task is to interest the management, simply because executives must be shown that accident prevention work will benefit them. What is the best way to do this? Should it be from the economic, the humanitarian, or the safety first side?

C. M. BRADING: A good way to interest the management in safety work is to show that you have effected a reduction in accidents, as this necessarily implies a lessened cost. Let the executives have a set of figures showing the exact reduction in the annual cost. This method will hit a man's heart more than anything else. You might talk generalities to the management for a week, and make no impression. So it is far more effective to submit the figures and say "Our accidents in 1914 cost so much; but we are saving in 1915." Of course, before bringing the matter before the management in this way, you must actually have effected a reduction.

CHAIRMAN: How about bringing in such figures from outside companies?

C. M. BRADING: That is a good idea, but the management would be more interested in its own figures. If you reduce your own accidents, you do not necessarily need to show the management the expense entailed in installing safeguards. The first cost of a good guard is all the outlay necessary to maintain that guard; and after these guards have been installed you will save money on the accident-cost.

E. M. SWITZER: It occurs to me that if we begin a safety campaign, we shall start at a point where we cannot show the management any figures at all, although we should like to do so. Mr. Shepard asks "How are we going to interest the management?" Naturally, somebody in that management must be initially interested, or we should never have a campaign at all. A good way would be to have that executive—he is probably the head of the concern—attend some of the safety meetings, and tell the foremen, superintendents and others that they must get thoroughly into the work, and do everything possible to stimulate it. I make this suggestion as applicable to conditions of starting campaigns when there are no figures whatever to show.

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J. M. EATON: You can certainly bring a statement to the management of what your accidents *cost*. Of course, at the commencement of a safety campaign you cannot present any estimate of what you are going to save, for that is an unknown quantity. But you can have the executive come to the first aid room when a man with a shattered hand, for example, is waiting treatment by the doctor. What your executive then sees and feels will accomplish more than you could attain through two years of talking figures. I know this, because I have tried it.

SECRETARY CAMERON: I had the same experience that Mr. Shepard speaks of when I started safety work at the American Steel Foundries in 1910. I began by educating every official in the company. When an accident happened in any plant, I sent a report to the Purchasing Agent, the Vice-President and the President; and so I got all of them educated as to what was happening. It took me about six months to get through. I worked on comprehensive lines; persisted in the campaign of education; and submitted figures epitomizing the history of accidents, how they occurred, and how they could have been avoided.

F. H. HANSON: I think any employer of labor in the United States will take up the subject of accident prevention if the subject is presented to him in a *competent* manner. Once he realizes that accident prevention is good business policy and means dollars and cents to him, you can certainly secure his interest.

A MEMBER: I contend that it is not the man at the very top you have to deal with, but the superintendent of production. It has been suggested that if you explain to that man that the accident-cost—particularly under our new Compensation Acts—will come out of the net profits secured through production, it may be possible to estimate just how much reduction in casualties will offset this accident-cost.

W. GREENWOOD: That has been actually proved in the discussion of basic principles. I invariably find there is a dearth of good statistical information. Suppose one man says that the accident-cost has been reduced 88 per cent, and another 68 per cent, on what basis do they start? Do they begin with a bad or a good record?

CHAIRMAN: Most of them start with a bad record.

W. GREENWOOD: It is to be deplored that we are handicapped by lack of authentic statistical information when discussing accident prevention. Such statistics as are here displayed are not satisfying and they have but little value when making comparison of one with another. As an instance, in the cases where the reduction shows 60 to 80 per cent, the methods for keeping down accidents before any reduction was shown, may have been very bad, while in some other cases where the reductions are shown to be much less, the conditions before beginning to note the reductions, may have been much better than in the cases showing greater reductions. We might erroneously assume from the statements here bulletined, that the one showing the highest percentage of reduction has the best record.

Confining myself to the subject under discussion, in starting an accident campaign, a method that I would suggest starting at the beginning of the game, and one that would be helpful as you go along, is to devise a good system for carrying statistical facts on forms that you can look at every day or any minute of the day and see where you stand. From this form a summary can be made covering any interval between the time of last summation and the present, which can be added to previous summaries if desired. Such a form need not be any larger than such as are used in many instances for keeping record of production or other operating detail on, and every accident that occurred would be transcribed from the hospital, foreman or other reports, to this form. Under the headings provided would appear name of injured, his foreman, department and all other information that might be inquired for by anyone interested. To summarize from this form it might be necessary to separate the facts, like foreman, nationality, department, etc., by counting them off, but in a majority of columns the footings need not be so divided.

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I doubt if anyone has kept a record in just such a way, and I have failed to see such a method in practice in any of the many industries I have visited for the purpose of getting information on how to prevent accidents. The method of summarizing periodically from file records is too cumbersome, and the labor discourages effort to investigate records as frequently as is necessary.

If the management can be shown who gets hurt, their nationality, age, habits, and the various other things that have a bearing direct or indirect, on the cause of accidents and their prevention, as could appear under 40 or 50 different headings, it can make an analysis of records at any time and can quickly apply remedies at the places where most needed.

E. B. MORGAN: I do not think that the question of winning the management is entirely one of dollars and cents. I have not met a man yet who will not respond to the humane appeal.

H. L. GANNETT: We began with the slogan that we did not want ambulances backing up to any of our stations and sub-stations. I think it would be a good plan to send a plotted curve to the head of the department showing the reduction in accidents for his section. This should have a material effect.

H. W. FORSTER: In talking with many managers about the advantages of safety work, I first brought forward the humanitarian appeal, because I second Mr. Morgan's contention that men are entirely open to such a plea. Then, secondly, I have told him (using such information as was available) that people could make more money through safety effort than could be secured through any other phase of their activities as a rule. Lastly, I have said: "You have got to do this in any case, because the State compensation laws are forcing you to do it."

A MEMBER: Answering Mr. Shepard: The easiest way to educate your management, your foremen and superintendents, is to get a good safety man to address a meeting. Then the rest is easy. That proved the case in the education of our management.

E. C. DEKAY: Mr. Shepard raised a question as to starting the entering wedge with the management. I suggest that the time consumed by other employes in taking care of the injured be carefully noted in each accident which occurs; and that the result, expressed in dollars and cents, be shown to the executives as a starter.

DR. B. L. REITMAN: It is necessary that the management should show tangible evidence of interest in the workmen, and not in the sole question of saving money in damage suits.

CHAIRMAN: If you bear in mind what Mr. Bullock said, you will have surmised it is useless to hope for the workmen's interest until the management has gone ahead with the necessary guards. That possibly implied the proving to the workmen and the officers the necessity for each doing his part. I think every safety man here will concede that it would be ridiculous to establish a safety organization, with workmen's committees, until a considerable amount of good guarding has been done.

L. R. PALMER: It is decidedly necessary to secure the workmen's co-operation. If the management amply demonstrates that it is interested in the way the men are taken care of when injured, the men will readily see that the executives are sincere in their attitude. One plant with which I was connected had an accident-record of two and one-half men injured out of one hundred each month. Now their record is down to .18. They put the humanitarian side into the work; and I believe this shows that the management inclines more to the humane ideal than to the dollars and cents aspect. From talks I have had with officials of the United States Steel Corporation, I am convinced that they care far more for their record of men saved from injury and death than for the monetary saving which accompanies that record.

ST. CLAIR B. BYRNE: Have any here had experience of safety work in the oil industry, where workmen are exposed to serious conditions through possible ignition of oil? Carelessness with matches is a big problem. The clothing of the men is saturated with oil.

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L. A. DEBLOIS: Before hiring workmen, my company makes it plain to them that they cannot have matches. But one cannot stop there. You must liberally post signs prohibiting matches, and regularly search the clothing of the men. In all of our works, the policy is to discharge any man found in possession of matches. There are exceptions—as when a man is laid off—but as a rule the men know that discharge is the penalty resultant on finding even a single match. So if Mr. Lane wishes to combat the "match hazard," he cannot pause at the hiring-end. The work must be persisted in right along; but, even with all this effort, men will still be discharged from time to time for carrying matches. It is a long, hard, uphill fight.

ST. CLAIR B. BYRNE: Our men work in isolated locations. Some of them are recruited from the remote parts of Mexico. We provide them with safety matches only, each box having a label warning the man before he strikes a light. Some of our men have struck matches in the gas-engine house; and after they have been taken to the hospital, could not explain why or where they struck the matches; but we have assumed it was in order to smoke. Then, saturated as they were with oil, there was little hope for them.

ORGANIZATION AND MANAGEMENT OF SAFETY COMMITTEES.

CHAIRMAN: Now for the next topic: "Organization and Management of Safety Committees." Someone here has made a surprising statement to me. He maintains there are many concerns here in the East who do first-class safety work, but who do not have safety committees. I do not know whether he meant it; but in any case he said he did not believe in it. Out West, we do not think a man is doing safety work at all unless he has workmen's committees. Mr. Burr of the Illinois Steel Company will now speak.

K. M. BURR: On the assumption that the management is interested in the elimination of accidents, I proceed immediately to the organization and management of safety committees. Enthusiasm must be the key-note of the organization and operation of safety committees. The movement must be a "men's movement." Because of this, I do not think that the management should lay down a standard form of organization for the men, and tell them what they shall do and what they ought to talk about. The main point is to make the men on the committees feel that the management is absolutely sincere in everything; and the form of the organization and its working should be left to the men. Enthusiasm will be killed if the ideas of the management are too strongly impressed on the men. I do not think it proper that the superintendent of a shop or a department should be chairman of a safety committee, because the tendency and the danger is that he will inflict his ideas too forcibly on the men. He should be the mainspring. He must be enthusiastic, and he must demand results. Different shops and departments have varying problems. The temperament of the men in these several sections is also a problem. Because of this, I feel that the organization in these sections could not be standardized. The first essential in any safety campaign is to engender an enthusiastic spirit in the men. But no one man can accomplish this. You must render your foremen enthusiastic, and let them transmit that feeling to the rank and file. Probably the best way to accomplish this is to have the foremen or safety committee members talk safety in a personal way to groups of workmen. I think you should insist upon securing written reports of such meetings. We ourselves at first had difficulty in procuring such reports, owing to the differences in the natures of the foremen and the men. Many men object to making a report of something which they look upon as only their duty. I hold, however, that the effect of these reports is psychological. When a man is required to prepare a report, he will embody something of interest in it. He desires to show that he is talking to the men in an effective way; and when this must be put in writing, his mind lies closer to the work. As a result he develops ideas; he develops himself; and increases his ability to hold meetings and impress the men with his enthusiasm.

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Discipline should go hand-in-hand with education. Some men must be disciplined: they will not do as they are told. Men must accordingly be impressed by the idea that safety work is for their own benefit and that of their fellows; but if some of them will not see matters in this light, then discipline is a necessity. If still obdurate, they should be discharged. I think the "discipline-cases" should be posted in some instances: not as a punishment to the man who has transgressed, but as an example to the other men and as an indication that the foreman is in earnest.

CHAIRMAN: Mr. Burr, how many workmen have you on a departmental safety committee? How often do you change these committees? Do you put on the more humble class or the more intelligent class of men?

K. M. BURR: In harmony with my contention that the workmen or committee-men will develop their own ideas of organization, the number of men on a committee is not prescribed. Some of our committees consist of three men, while others have as high as thirty. I believe large committees are preferable: they spread the gospel of safety more effectively.

CHAIRMAN: How often do they make inspections? How long do the men serve on the committees?

K. M. BURR: In developing the educational idea, I believe that the "soft pedal" should be applied to inspection. The natural tendency to education of men has been along the lines of least resistance. I hold that in directing matters, you should lay aside all consideration of personal contact and education. Our committees, which are selected by the superintendent and empowered to add to their number, have executive privileges. They recommend the infliction of discipline should they see fit; and they criticize workmen who are careless. I am not in favor of rotating committees. I think that the members of a committee should be permanent.

CHAIRMAN: Do you not think there is an advantage in changing committees so that a larger number of men will glean experience in finding things out for themselves?

K. M. BURR: No. The maintenance of a permanent committee seems to hold better efficiency results, for the longer men work on a committee the more capable they become. My personal inclination runs toward increasing the size of a committee by adding another man to it.

CHAIRMAN: Do you encourage a workman to make a practice of reporting careless practices and conditions to the workmen's committee?

K. M. BURR: Yes. We have, moreover, several non-English-speaking men on our committees; and as these men are connected with gangs who likewise do not speak English, our experience has been that such men are among our best safety propagandists, and able to expound accident prevention more efficiently than the average English-speaking man.

CHAIRMAN: That is a pointer to the "Doubting Thomases" who think that only the higher-grade men should serve on workmen's committees, and that results will not be attained if lower-class men take part.

SECRETARY CAMERON: In the case of a plant which is commencing safety work, how would you start the committees? Is it not essential to have a safety inspector take the initial steps?

K. M. BURR: I believe in safety inspectors, but these officials should be "easy bosses." They must not too obtrusively inflict their personality and ideas on the committee. Suggestion and not coercion should be the order of the day.

CHAIRMAN: In your capacity as a safety inspector, Mr. Burr, are you authorized to inflict penalties for disobedience?

K. M. BURR: Yes. But I disapprove of such penalizing: I do not consider it proper. It is seldom that safety inspectors inflict penalties.

A. T. MOREY: Mr. Chairman, what is your thought in locating the men on committees, and in changing them?

CHAIRMAN: The experience of the companies in Wisconsin who are doing the best safety work is that it is well to change the committees about once every three months.

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A. T. MOREY: The whole committee?

CHAIRMAN: It must be borne in mind that they are not all new men: although it practically amounts to that. They will take off two members and leave one, or take off one and allow two to remain; but in any case, one man serves three months. These companies consider it proper that workmen should be given the experience of actually going through the plant and ascertaining matters for themselves. Possibly the type of committee of which Mr. Burr has spoken is balanced or overweighed by that advantage.

B. W. CONKLIN: We have about 500 men at our plant. The plant committees, of three or four men each, meet in the foreman's office once a week, and then submit written suggestions or recommendations relative to dangerous places and the like to the central plant committee which foregathers in the superintendent's office. The central committee discusses these points, and reports are sent back to the workmen's committees, as to the action taken upon the suggestions. We rotate the men on these committees, but each man serves generally about a month. We let one man drop out, and put a new man in his place. Then, by coming in contact with the other two men, he becomes cognizant of the work being done. The nationality of the men does not make any difference. Any very good suggestions are rewarded by the giving of a safety button. The men themselves do not formally inspect a department, but as they are there during the entire working day, they may be said to be "inspecting" all the time. The amount of good in the suggestions we receive is surprising.

B. F. TILLSON: In our mine operations, the workmen's committees have proved invaluable. Where you have over 90 per cent foreigners, all separated in their work, the factors of co-operation and education of the workmen are far more important than the operation of mechanical devices for safety. We have workmen's committees of four members who make a tour of underground inspection once a week, accompanied by the mine foreman. The company pays them the full day's time. These men rotate on the committees; new men come in each week, so that there are always men on a committee who have mastered the rudiments of what the committee is working for. The committees serve four periods of a day each in four weeks; and the entire method is bringing results. Our chief gain lies not in the suggestions—which have proved infrequent—but in calling dangers to the attention of workmen at the actual point at which they are busy. This plan has been followed for eighteen months; so that now about eighty men on these workmen's committees have been recruited from the rank and file as well as from the "bosses" in more than half the mines. When they come to an unsafe condition at a working-point, they have authority to call the attention of the workman there to the danger, and it is remedied immediately. The mine foreman, who accompanies the committee, has power to see that their recommendations are enforced, and work is suspended while the committee waits the proper change in conditions, whether these be involved in topping or trimming ground or in keeping the explosives, detonators and caps together.

CHAIRMAN: Have you mixed committees—foremen and workmen together?

B. F. TILLSON: Originally we began with the general foreman on the committee. These men served in rotation. The shift bosses came in turn; and then, when these shift bosses had all passed through the workmen's committee stage, the most intelligent or the highest-grade labor came next. We are accordingly "working down the line" in that way; and hope that eventually—if the source of labor does not change too rapidly—we shall have had practically every man on the safety committee at some time or another in his career. Men serving on the committees receive a badge with a red border, which denotes the authority of safety committeemen; and when, after graduating, they are exempt from service, they receive a permanent badge with a blue border in return for the red-bordered one. This permanent badge designates the prestige they enjoy in having filled such a position, and as the men appreciate such prestige, we profit accordingly.

CHAIRMAN: Mr. Tillson, when you

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get down to the humble men in time, will a committee be composed entirely of them?

B. F. TILLSON: It is actually composed of the humbler men, for 90 per cent of the units are of Hungarian, Slavish, Polish, Lithuanian, or other alien labor.

CHAIRMAN: Have foremen and workmen served on any committee at any one time in the mines?

B. F. TILLSON: No. They are all humble men.

CHAIRMAN: Do you believe in the "mixed committee"—composed of foremen and workmen? Would it give better results than the committee composed of workmen alone?

B. F. TILLSON: We prefer a committee of workmen only. At present, one factor acts as a stimulus to the shift bosses. When the workmen on the committees find something wrong, it is virtually a reflection on the shift boss himself. Hence there is a stimulus to the boss to make sure that his conditions are above criticism by his subordinates. Before concluding, I shall touch upon one other interesting feature. John, let us say, has served upon a workmen's safety committee and graduated from it. Some of us may come along at a future time, and find John transgressing rules which he has learned while serving on the committee. He has no opportunity for apologies—no pretext for pleading ignorance of conditions which he himself has already called to the attention of workmen. Hence it is gratifying to feel assured of the interest which the workmen on the committee take in "calling down" men of the "John" type who are caught in infringement of rules. The foreman seldom has to prod the committee, but he will do so if it has overlooked any point. We have encountered no serious abuses whatever in such criticisms of the men by their fellows.

H. B. VINCENT: Which is the best organization in the case of a high-tension electric transmission company supplying current for light and power over a territory of from eighty to one hundred miles; where there are probably ten to twenty men in one place; ten men twenty miles further down the line; and where—maybe—there is a central organization at the power-plant in the center of the transmission area? Is it best to have one representative or else a small safety committee at each place?

H. A. BULLOCK: I am not engaged in the power-transmission business; but speaking from the point of view of detached units, I think there is a minimum number of men among whom you should attempt to formally organize a safety committee and so distinguish the members of that committee from the other men at that point. Take, for example, the situation of a company like ours, having a number of sub-stations with two or three men in each. The departmental committee of their department can keep in touch with these men, and make them—in effect—safety inspectors at that point. I do not think it a vital question whether we have a specially designated safety inspector to inspect sections, or whether, through properly organized committees the men perform their duties according to their own judgment of conditions. Once we secure the right spirit, I think we can more or less trust the men to determine the best method of procedure. In a plant such as Mr. Vincent has alluded to, I would suggest that the men be regularly brought to headquarters in smaller or larger groups as the case may be, so that they may become aware of the centralized safety activities, and have their minds opened. The principle, gentlemen, is the "open mind." It is not to tell the man something that he doesn't know, because as soon as his mind becomes receptive he knows it better than you do. A motorman or a conductor knows what is safe or unsafe in operating a car better than a depot superintendent who has a lot of things to look after; better than a division superintendent; and far better than the general manager, and. perhaps, the president, who do not know anything about it. If only we can manage to keep the men's minds open through proper organization and

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co-operation, I think the matter of inspection will take care of itself.

CHAIRMAN: Can anyone else elaborate upon Mr. Vincent's query?

H. B. HARMER: We have a safety organization composed of a general safety committee. This committee is composed of the heads of various departments, and superintendents and managers. Under them are sub-committees appointed at the various substations and plants of the several departments. If an accident happens, a copy of the accident-report is sent to the sub-committee by the general committee for examination and study which will lead to the elimination of that particular type of accident. We do not have a safety inspector; but the claim department has charge of that branch of the work; of having safeguards installed; and of calling the attention of workmen to typical accidents, with the end in view of eliminating that class of casualties. We have cut down a certain class of accidents 100 per cent; in other words we have abolished them entirely by different practices recommended by that committee. The committee members are called the "Safety Council" or "Council of Safety," and have a distinguishing badge given to them. We value this committee highly, and it has worked out satisfactorily. At the end of six months, two or three men drop off the committees, and new men take their places. In this way, every man serving on the committees has six months' instruction in safety work, and then the newcomers secure six months' contact with the existing members of the committee.

S. W. ASH: Have these committees largely an educational aim? What I desire to bring out is this: If you feel that you have a fairly good educational scheme, but do not have workmen's committees, what advantage do you think can be secured from such committees?

ELMER B. TOLSTED: The two main advantages accruing from a safety committee are that you get in touch with the workmen on the committee who know things that the president, vice-president and inspectors cannot possibly be aware of nor find out, because the workmen will not tell their superiors. They will tell their equals, however, and this is what counts. In fact, this very getting at the workmen not on the committee through being able to talk to their equals is one of the biggest advantages which the safety committee plan possesses.

A. MEMBER: Mr. Chairman, take that case of sending men out on transmission work. Suppose that the men do not all make up the same gang. Two or three men in that gang may be employed on one kind of work, and ten men on another; thus dividing them up. Here is a suggestion. If five men go out in a gang, one of them should be appointed as a safety man. He should wear a button. I believe you will all agree that it is necessary to have one man responsible for any duty; so that the appointment of one safety man in a gang gives him the business of looking after the rest for six months, and his word must be obeyed.

W. T. HANNIGAN: We have about 13,000 employes scattered over a wide territory in four states, and at no place is a large number of employes concentrated except in the large cities. Our company appointed a safety man and a physician to regularly visit the various cities and towns in our territory to talk safety and give first aid instruction. This plan is meeting with great success. Once a week, or at least once a fortnight, we send out bulletins to each individual workman, which are made up from the facts of actual accidents, and which illustrate why such accidents happened and how they occurred. During 1914, we had about 525 accidents causing lost time. Last year we had only about 325 such casualties; a reduction of 200. Every man is told he is expected to go through his plant and request the men to make inspections for unsafe conditions. In three months we received 1,500 reports, which saved our spending many thousands of dollars. And under widely-spread operating conditions—such as obtain in electrical transmission—we

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believe methods such as the foregoing form the only effective means of getting at the men, instead of endeavoring to work through safety committees.

J. S. ROCKWELL: I represent one of the smaller railroads of the up-to-date and prosperous type, operating along some 600 miles. So far, I have been unable to get my management to consent to the formation of any system of workmen's inspection committees. We have therefore done the best we could without them; and have succeeded in reducing the number of accidents by 50 per cent and the cost of accidents by 75 per cent. Our activities have been along various channels. One method, which has worked out well in practice, is the transmission of a periodical request to all our employes that each man—for a period of from one to four weeks—should make an inspection and report to his immediate superior every unsafe prac tice or condition that he can find. The immediate superior at once corrects all conditions that are rectifiable within the limits of his authority, and then passes on a report to his own superior. Finally, after all these suggestions have passed before the several officials, they come to me. Then they are tabulated, and discussed in a conference of the general officers of the company. Most of the conditions are corrected. Afterwards, every man on the railroad who has made a suggestion receives a personal letter from me telling him whether his suggestion has been acted upon; and, if not, why no action has been taken. If the suggestion has not been looked upon as a proper one, the man is told the reason. We have an inspection and safety committee in connection with our fire department, composed of four or five fire department men, headed by the chief. They make inspections of all our shop points, not only for fire-hazards, but for dangerous conditions. These activities, coupled with constant instructions to our foremen, who are required to exercise great supervision, have yielded excellent results. As a large percentage of our section hand laborers understand little—if any—English, we require each section foreman to give talks to these men, and detailed instruction in their work; how to handle tools, to be careful of passing trains, and so forth. Once a week the roadmaster calls the section gang together and addresses them along the same lines. Every three months the heads of departments and their subordinates travel over the system in an inspection train, and these men scrutinize everything on the road with regard to cleanliness, good housekeeping and safety. Before resuming my seat, I should like Mr. Fonda to bring out the points that they have experienced in their committee work.

G. T. FONDA: Our average worksforce to-day is 16,000 men: a large number to reach. We have had safety committees for every six months of work; but I differ with Mr. Burr in some of his conclusions. For example, we have found it very necessary to have a man versed in safety work take the others round and point out the way. We have had many men on the committees who would not be classified as "intelligent" nor "intellectual," for the simple reason that such a type of individual is not commonly met with in a steel plant, and it is the fellow of low mental caliber whom we have to reach. We accordingly appointed a man who devoted his entire time to circulating these men through their departments, and pointing out to them the different things that we desire them to think about and recognize. As Mr. Burr has mentioned, we put the "soft pedal" on guarding, for we were doing that with a fixed force of operatives as fast as we could. So we put all the stress on the mere question of preventing the "near accidents" in the conditions we could find, and indicating to the men being taken through the department where they could tap a man on the shoulder and say: "Here, Jack, if you keep on doing that, you'll get hurt." We harp constantly upon this to the men. Our safety committees comprise altogether about 200 workmen from the rank and file, and these committees are divided into about 40

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groups of five men each. One man, who is chairman of the fixed committee, and who is more or less familiar with clerical work and first aid, acts as guide to these men, and assists them in preparing an intelligible report. He holds the meetings, and molds the men's ideas into a readable report which is transmitted to our safety department. The recommendations are brought before the general plant committee. The members of that committee are the general superintendent (who acts as chairman), the yard superintendent, the electrical superintendent, the master mechanic, and the secretary and treasurer of the company. It is essential to have officials of this caliber on the committee as the recommendations frequently involve matters of policy which demand executive attention, and in some instances authoritative explanations must be forthcoming as to why any particular suggestion cannot be acted upon immediately. In addition to pointing out careless practices to the men through their department, and asking them to recommend remedies for mechanical defects, we educate them in first aid work. The committees meet one hour during each week, and with the assistance of a competent man whose work is confined entirely to first aid activities, we teach them what to do in case of emergency. With a view to fostering the "team spirit," our first interdepartment first aid meet will be held on November 6 at the Lehigh University Athletic field. All our officers will attend that meet, and their presence there will show the men that the executives are sincerely interested in what is being done. Our conviction is that the men can profit by a certain amount of first aid knowledge, on the principle that by knowing what to do in serious accidents, it will make them think more about such accidents and their results.

J. C. SMITH: Having had ten years' experience with various forms of safety committees, I do not believe that any one standard type of organization for such committees will ever be adopted in any given plant and followed out unvaryingly for any great number of years. No one set form of organization will adequately meet conditions in all plants. It is in changing things around and in stimulating interest that the greatest good may be accomplished. When safety committee work was begun ten to fifteen years ago, department safety committees were the rule. Then "rotation" became the rule; other departments were organized; and now some companies are veering back to the permanent plant committee plan. When the Illinois Steel Company began safety work ten years ago, it first organized departmental safety committees. These committees were large; and it was difficult to get the men to devote sufficient time to the work. We therefore changed this: divided the plant into five sections; appointed one man in each department; and had three men in each division. One man left each committee every two months, so that the whole committee rotated each half year. That gave us results from the safety point of view; but our superintendents were not satisfied with the plan from the operating end. These superintendents did not desire any committee of inspection—they wished a department of their own. No regular number of men was assigned to any departmental committee. As far as possible we endeavored to have the assistant departmental superintendent act as the committee chairman, with power to appoint as many committeemen as he desired. I think that by placing responsibility upon the committee chairman, and by having the committeemen report to him, better results are attained; and we then have a number of men who have thus an organization of their own and practically under their control. We hold—as Mr. Burr has already expressed himself—that the committee should not spend much time in inspecting all the departments. But we believe it is a good plan for the committee chairman, accompanied by the safety inspector or his assistant, to inspect each department once a week. As a rule we do this; and the inspection is a thorough

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one. Apart from this feature, the committee must work out its own salvation. In order to eliminate "dead timber" on the committee, we recently adopted a plan which I think is new. Every week, each member of the committee has to report to his chairman what he has done for safety during the preceding seven days. This, mark you, is not a case of making suggestions or recommendations. It must be a showing of something actually done to promote safety: either that some man has been told to perform a task the right way, or that a dangerous condition has been corrected. In this way we can ascertain if a man is carrying out his duties properly. If he is not doing as well as he might, we encourage him: but if he manifests continued apathy, we replace him. Such a method should lead each committeeman to work steadily for results. This year we have received 100 per cent more suggestions, and have had more committee work done, than last year; and this proves that the committees are alive to their duties and responsibilities. So far this year we have had about 2,400 suggestions of repairs from the committees. In the actual formation of a department safety committee, we appoint a member from each section of the plant. All in all, our experience has been very favorable; and I heartily believe in safety committee work.

CHAIRMAN: Mr. Smith, do you believe that the plan of workmen's safety committees can be adopted in the case of plants of 100, 200, or 300 men, and with just as good results proportionately as in the case of your own company's establishment? I make allowances, naturally, for essential modifications in the form of the workmen's committees.

J. C. SMITH: Absolutely—there is no question about it.

S. W. TENER: Here is a thought which has come to me. The National Safety Council is growing large; and this implies a diversity of interest. Mr. Hannigan, who recently spoke, is connected with a telephone company; so what possible interest can he have in rolling mills, wire mills, and other such plants? The situation is entirely different. Naturally we would not do away with our safety committees under any consideration; but at this juncture I think that either Secretary Cameron or I should indicate to those here assembled that it is the purpose of the National Safety Council *to develop the "sectional idea" from now onward* under the jurisdiction of its new board of directors and executive committee. I feel convinced that Mr. Hannigan and his other telephone company colleagues would like to take part in a round table meeting where workmen's committees were not under discussion, because I do not think that such committees are appropriate in the work of telephone companies; and I also doubt if a railroad could profitably utilize such committees to any extent. But the point I emphasize is that the *sectional work of the National Safety Council will be an important matter during the coming year, and that opportunities will be given in the future for men interested in particular industries to get together and have round table discussions of their own.*

CHAIRMAN: Mr. Tener has just been elected an executive committeeman of the National Safety Council, and all of you have evidence that he is to get busy immediately. Mr. Morey, will you please respond to Mr. Tener?

A. T. MOREY: When we realize the diversities of plants, it stands to reason that such dissimilar conditions call for variations in safety committee matters. Even in the case of the same class of plants, we have had the proposition advanced that, on the one hand, a stationary committee is the better, while, on the other, some maintain that the "rotating" type of committee is preferable. I have even heard the opinion expressed that in certain instances there is no belief in any class of committees whatever. My own impression is that these three points of view are possibly all correct, and refer to different phases of work in the same plant. When, for instance safety work is initially embarked upon, it may be that the "rotating" variety of committee should be in vogue, so that all may

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have an opportunity of comprehending what the accident prevention campaign stands for. Then, later on, perhaps the stationary committee may prove the better; and, last of all, when the superintendents and foremen realize that safety is basically a matter of efficiency in operation, the committee may finally be eliminated. I have thought it politic to outline all this in order to prevent confusion of thought, and to offset the possibility of any of us leaving the meeting with the conviction that some do not believe in safety committees at all, while others again are supporters of one type of committee and some of another variety. Do you not accordingly think, Mr. Chairman, that these beliefs refer essentially to the different phases of work which I have outlined, and are not therefore in conflict?

CHAIRMAN: I am glad you brought up this point, President Morey. What really concerns us here is the fundamental principle of recognizing the workman and giving him some active participation in safety activity, so as to win his confidence and interest, and to educate him. Speaking of the State of Wisconsin—with which I am familiar—there are all classes of industries there. Workmen's committees have been tried out in these plants, and as good results obtained in the case of a street railway company as in the case of a paper mill. I do not accordingly think that the specific class of industrial or other activity makes any difference in the success of a workmen's committee—but, of course, I may be in error as to this.

INSTRUCTION OF WORKMEN.

CHAIRMAN: Our next subject is one of vital importance. It is the "Instruction of Workmen"—especially the new men, and the non-English-speaking operative. Will Mr. James, of the New Jersey Zinc Company, be good enough to start the discussion?

J. D. JAMES: Four or five years ago, the officers of the New Jersey Zinc Company became aware that accidents were happening in the plant which ought to have been prevented. This led to the formation of a safety committee composed of the working heads or superintendents of each department, which was deputed to look for dangerous conditions or machinery. You can readily imagine that it took but a short time to convince these superintendents that they were confronted by a large task. Lacking the time essential for proper grappling with these duties, they looked around for a man competent to inspect the whole plant and recommend essential safeguards. It then became also apparent that the inspector would himself require assistance in this work; so a man from each department was deputed to aid him, and the group of these assistants was called the Workmen's Safety Committee: based on the fundamental principle that the men from the different departments should be educated in the safety habit. We decided that the department men on this committee should rotate continuously, and that as each man's term expired every week, a new man should be brought in. This would maintain the force of the committee at a steady level of eight members, and give it eight days to make tours of inspection. Soon we found that orders for guards began to pour in, and a force of men was deputed to fill these requisitions. Suggestions still flowed in quickly—too quickly, almost—so we resolved to divide the committee, relegating half the members to tours of inspection of the plant or certain parts of it, and the other half to consideration of first aid work. We wanted to have the right man to attend to any accident which happened. As a result of this first aid instruction, we now have over 104 competent men able to act in emergencies. When a man gets through his eight days' course in first aid, and is able to undertake bandaging and resuscitation, he is looked upon as a competent graduate. He acts with authority in such work, and in the knowledge that he is expected to keep his department as free from accidents as possible.

CHAIRMAN: How do you instruct your new men? Take, for example, a non-English-speaking foreigner, who

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may have come right into your plant this morning.

J. D. JAMES: I have served on a committee where we had a number of foreigners who could not speak good English. We took them round the plant with us, and when we came to a belt, a bevel-gear wheel, a sprocket chain, or a shaft, or, in fact, anything that looked dangerous, we indicated to them the particular hazard involved in that appliance.

CHAIRMAN: Does your foreman instruct a man when he comes into the plant for the first time?

J. D. JAMES: Not all the time. The safety committee, however, takes particular pains to instruct the new men as they come on the committee. The foremen's department is supposed to do this without being told.

H. J. BELL: The one basic principle in safety is to convince the workman that *he* is the man who gets injured, and bears the brunt of an accident. It is the man on the job who suffers. So of course we must teach him safety methods. The way in which the teaching is carried out is not the all-important element—it is the result accruing from such instruction which matters. It seems to me that we must accordingly get a real safety committee with wide powers. We must impress upon the members of this committee that the more they speak and do for safety the more will they be appreciated. I do not think it is proper to put the "soft pedal" on the guard proposition or on anything else. We invariably criticize our men when they do not make suggestions, whether the point involved is one of safeguarding or not. This does not mean that we invariably do anything they suggest but the point is to insure a constant influx of recommendations. We certainly get them in good measure, and the majority are logical. Given a good safety committee, my belief is that the best way to instruct the workman is by encouraging activity. Get the men to attend to every item, and send them into departments other than their own. Again I reiterate the fundamental idea that the man who works is the man who gets hurt. He therefore has the most interest in safety work, and you ought to make him a controlling factor in it.

CHAIRMAN: Mr. Bell, do you consider the Chicago & Northwestern safety committee work the best form of your accident prevention activity?

H. J. BELL: Yes. If the safety committee be properly conducted, it is the best thing for a railroad, and for any other form of activity.

CHAIRMAN: Will Mr. H. B. Smith now speak to us on the instruction of workmen: particularly the man who doesn't speak English?

H. B. SMITH: A little over four years ago, we secured the services of a linguist, who, as each new man was employed, talked safety to him in his mother-tongue, and told him that he should report to the doctor whenever he received a slight injury. This linguist then asked the foreigner if he had understood what the foreman had told him; and if it turned out that the man did not grasp the foreman's talk, then the latter had to reiterate what had been said. We have secured good results from the work of this linguist. If any workman whatsoever has been off for more than thirty days, he must —irrespective of length of previous service—be re-hired; and the linguist must again give him the same line of talk: hammering home the conviction that safety must be one of the man's first duties; and while the linguist does not devote as much time to the re-hired man as to the out-and-out newcomer, every man is systematically reached in this way. The linguist relies upon data from the employment office to keep himself in constant touch with the men. Here is a little story to show you how the safety idea takes root: Two years ago a street fair was held at Joliet, and one of the traps laid for the unwary nickel was a flimsy-looking Ferris wheel. Two foreigners saw the wheel. One of them said to the other, "Come on, John. Let's take a ride." The other glanced at the wheel—then quick as a flash came the rejoinder "Oh, no—Safety First." The man wouldn't trust himself on that

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wheel—he instinctively felt it was not sufficiently safe. There are, of course, many ways of reaching the men. For instance, one of the duties of the linguist is to examine men in their own language on the safety rule book; and they get a safety button for answering 90 per cent of the questions correctly. Our coke man, who has 300 under him, recently reported that every one of them had a button. This speaks for itself. The mere fact of a man not being able to read his own language does not excuse him. There must be someone at his home who is able to read the rules to him; and we have many instances of successful examinations of men who can neither read nor write their own language. Frankly, I do not know of anything that is of more benefit to them than this examination on the rules. We began the plan in 1910 and I believe in it as implicitly as ever. Our linguist makes a monthly report of the number of new hands and of old hands to whom he has talked.

CHAIRMAN: What would you do in the case of a small plant of 200 or 300 men, and which could not bear the expense of an interpreter?

H. B. SMITH: I would get men from other departments who were competent to instruct, and see that such instruction was imparted immediately. Out of 300 or 400 men you should certainly have at least three or four who could talk the languages of all the men at the plant.

CHAIRMAN: Take the case of a Pole, for instance. Would you rather have an American Polish-speaking foreman instruct him, or a Pole who could speak English?

H. B. SMITH: I would prefer that the man of his own nationality should do the instruction work. Some years ago we adopted the plan of sending a printed card to every foreman within a week after the employment of each new man. The foreman must sign that card to the effect that he has instructed the man, and the man himself must also sign the card signifying that he has received instruction from his foreman.

W. GREENWOOD: Mr. Smith, are all the instructions of the Illinois Steel Company incorporated in rule book form?

H. B. SMITH: We have rule books which embody many of the rules and different conditions peculiar to each department, and this is the basis on which we work.

W. GREENWOOD: Do you depend upon the men remembering the verbal instructions they have received?

H. B. SMITH: Yes. The linguist goes to several departments and talks to the men in rotation after they are employed. If three or four men are assembled in one department, he can give them instruction together. I cannot exactly say how many men he could talk to in a day.

L. A. DEBLOIS: How long does it take the linguist to give instructions? That would afford an indication.

H. B. SMITH: The linguist goes to a man and asks him if he comprehends what the foreman told him about the hazards of the work. He tells the man that the services of the plant doctor are free; and that no matter how slight an injury he may sustain, he must see the foreman and then proceed immediately to the doctor's office, because the slight injury, if neglected, may lead to blood-poisoning.

A MEMBER: Mr. Smith mentioned that he sends the slightest injury to the doctor. Some others have stated that they instruct the men in first aid. There is a big difference between these methods. How do Mr. Smith and his company feel on this matter?

H. B. SMITH: In our plant of 3,000 men we have our first aid course, but the men do not apply such emergency treatment except in the case of electric shocks and gas cases. We use the prone pressure method.

MR. GREENWOOD: What would you do in the cast of a man with a broken back?

H. B. SMITH: Place the injured man on a stretcher, and send him right to the hospital.

MR. GREENWOOD: Would the men trained in first aid do that?

H. B. SMITH: No. There is a

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stretcher in every department, and it does not take any skill to place a man on a stretcher and take him to the hospital.

A. MEMBER: I understood that your foremen did not speak the foreigner's language. You say, nevertheless, that the new man is asked whether or not he understood the instructions which a foreman had given to him in his own language.

H. B. SMITH: The case is that the linguist asks the man whether he understood what the foreman told him; and if it turns out that the man did not understand, then the linguist will summon the foreman and see that the man gets his instructions so that he can grasp them.

F. W. SHEPARD: I scarcely think we can accept Mr. Smith's statement that it does not require any skill to place a man on a stretcher as literally correct. A man with a simple fracture has often sustained a compound one through handling by rough-and-ready men. I certainly think that in cases of this kind it is well to have a first aid team, or at least somebody who knows how to properly handle a man in taking him to the hospital.

CHAIRMAN: Mr. Morgan, I understand that you have recently carried out an ingenious plan of co-operation in safety work with the local newspapers in your district.

E. B. MORGAN: Well, I do not quite agree that there is anything ingenious in what we have done. We have simply made good use of the two foreign newspapers that are published in Granite City and read by most of our foreigners. We furnish these papers with the translated article, amounting to about half a column, once a week. In consideration for publishing these articles we purchase 100 copies of the paper, and our interpreter marks each copy and distributes them to our men who read that particular paper, whether it be Hungarian or Bulgarian In this way we feel we successfully reach these men through a new medium, as the paper not only reaches them personally, but also their homes, which brings an exceptionally good influence to bear. I think that almost any plant employing foreign labor could very readily make similar arrangements with its local newspapers.

MRS. LILLIAN BURT: During this discussion, we have not so far touched on the fact that the sober man is the more careful man. My organization, the American Issue Publishing Company, has prepared a set of leaflets and posters showing the scientific side of the alcohol problem. The copy for these leaflets was approved by Dr. Darlington, of the American Iron and Steel Institute, and by Mr. C. L. Close, manager of the Bureau of Safety of the United States Steel Corporation, before they were issued. They have been in use by large plants—especially in Ohio. Let me tell you of the reduction of accidents effected by the "Water Wagon Club" of the Bessemer and Lake Erie Railroad Company after using this material for eighteen months. This club is recruited from all classes of workmen. During the last six months they employed 3,380 men, of whom 1,500 were members of the club. Within that period the "Bessemer and Lake Erie" had 224 casualties which took the men from work for three or more days. Of that number, only 43 occurred to "Water Wagon" men. If the same ratio of comparison had held good with the "Water Wagon" membership of 1,500, as in the case of the 1,880 men who were not members of the club, there would have been 101 more accidents than actually occurred.

CHAIRMAN: I notice we have a number of ladies present, and I hope some of them are in charge of women's work in the industries. Will any one of these ladies speak on the subject of instructing feminine operatives?

MRS. N. SLAYBACK: There is a psychological effect in the instruction of workmen which has so far been disregarded in this afternoon's discussion. I have found in my own experience that I must place the working man or woman on my own level. In no way can I speak down to the worker from my position in society. You must make the worker see that you are not

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so much his or her friend, as that she or he is your friend. You will secure the worker's entire co-operation only when you have taken the operative from his or her plane, and placed that man or woman on your level.

J. SCHILLING, JR.: My company has rules prohibiting the holding of workmen's meetings of any kind within the plant boundaries. The first point I had to contend with was how to effectively bring the safety movement to the notice of the men. Well, the first thing I did was to don overalls; go on the staging of ships and into the machine shops; and watch the men handling tools. But that was not the entire solution of the problem in our plant, since we have 32 departments: each department having a superintendent, his assistant, and distinct conditions peculiar to itself. A number of foreigners, moreover, are employed in several sections. I accordingly organized a "Good Fellowship Association," which, composed of committees of intelligent workmen, takes up instruction in English, safety, first aid, social service and music. These committees meet in the evening and during the noon hour. The special function of the social service committee is to attend to the welfare of the injured. We found that alcoholism was one of the problems in the safety factor, because we had fifteen saloons within a radius of eight squares of the plant. The men were in the habit of visiting these places at noon-time, not so much for the drinks as for the lunches. So a special committee was organized in our Good Fellowship Association; and, after borrowing a little money from the company, we started a lunch-room of our own, managed entirely by the company. We commenced by serving sandwiches and coffee.

CHAIRMAN: How long has the committee been instructing the men in safety?

J. SCHILLING, JR.: Only about three months.

CHAIRMAN: Is the work proving satisfactory?

J. SCHILLING, JR.: Yes—fairly satisfactory. Of course, there is still improvement to be made; but during the last six months we have reduced accidents 14.25 per cent.

THE SAFETY-BULLETIN-BOARD.

CHAIRMAN: We must now pass to the next subject: that of "The Bulletin Board." Mr. Eaton will now give us his views on bulletin boards.

J. M. EATON: In my opinion there is no safety factor so susceptible of abuse as this very one of the bulletin board. I claim to know something of the matter because our plant has no so-called safety organization. Our only organization approaching one of that nature is a committee composed of executives which applies pressure to the foremen on certain occasions, so practically all our work has been done through the medium of bulletin boards. It is not the form or design of the bulletin board which counts—it is altogether a question of the matter posted on it; its location; and its being in a good light. We have a large number of these bulletin boards, which are erected in places where they can be easily seen. We have always adhered to the fixed rule of placing nothing on these boards which does not either deal with safety or is strictly germane to it. A good location is essential for the board, so that it may be seen by the largest number of men; the board simply must be well-lighted if results are to accrue; and it must exhibit matter which will interest the average man. I know it has been stated that good work might be done by posting statistical statements of reductions or increase of accidents in certain departments; but my own experience has proved that nobody reads such statements. The average factory hand loathes statistics. He doesn't really know what they are. Many of the men cannot add figures. The man must have something that appeals first to his eye and gets his attention. This causes him to pause at the bulletin board—his progress is arrested until he has found out exactly what the notice is. It may be a picture. Indeed, because we have a number of foreign-born employes at the plant we use pictures al-

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most exclusively in some departments. The printed statements in bulletins which contain pictures, and in bulletins which contain statements only, must necessarily be short. You cannot get results with long drawn out wordings. My observation proves that when the men read the bulletins they do so during working hours and not in the noon hour. They go through the plant; pass the bulletin board; and pause a little to read the bulletins. They certainly won't waste time reading a long one, because some one in authority may come along. The bulletins must therefore have something short, snappy and to the point. They must be drawn up in words of one syllable; something that the men will grasp immediately. I do not put much faith in slogans nor do I approve of a shop motto on the bulletin board. I am averse to anything which will be repeated constantly until familiarity breeds contempt. If you place a shop motto on a bulletin board and leave it there, it means absolutely nothing to the average workman. He doesn't pay any attention to it. Then you must have variety in the bulletins, and ought to avoid a repetition of "Dont's." Generally men dislike a succession of "Dont's." Our bulletin boards show from time to time a good many posters on health. We tell the men how to do this, or how to do that. For instance—along with National Safety Council bulletins—I have used one on tuberculosis, printed on yellow paper with a red border. This had really nothing to do with safety in the strict sense: it did not give the men any idea of the care they had to exercise in the shop operations. But it was something a little different, and it was widely read. Let me now outline our system of posting bulletins. The bulletins are changed every week, and sometimes more frequently. If there are two bulletin boards in a large room, or if there are two or more on the same floor or in the same building, identical bulletins do not appear on all the boards. Board No. 1 may have one class of bulletin, and Board No. 2 another. Boards Nos. 1 and 2 never have the same bulletin on each if it can be avoided. The instructions are to have Boards Nos. 1, 2 and 3 all different. Of course, when it comes to Boards Nos. 5 and 6, you may find the poster on Board No. 1 repeated there. The idea is to have the man find something new on each bulletin board, so that his attention may be drawn to it. Naturally we have our general bulletin board on which "lost and found" notices and the like are displayed, and a small board on which notices pertinent to the benefit association are shown; but constant change is the rule as regards the safety bulletin boards proper. We do not post any bulletin simply because it is a bulletin. We exercise discrimination. We must have bulletins which tell the men something they can believe in. I feel that a good deal more can be accomplished through the use of bulletin boards than is generally conceded. If you will be as sincere in your bulletins as you are to the men in your personal relationships with them; if you will post nothing on the boards that you do not yourself believe in and are prepared to back up; and if you will change the bulletins frequently, you will rouse a remarkable degree of interest—to say nothing of results. We have reduced our accidents some 60 per cent in three years using practically nothing outside of the bulletin board work.

HOW TO KEEP UP INTEREST IN SAFETY WORK.

CHAIRMAN: I am sorry that we must pass from this subject of bulletin boards; but I find comfort in the fact that the bulletin board question has been thoroughly presented to you in the graphic exhibit of such boards in our exhibit room. The next subject will be "How to Keep up Interest in Safety Work." I ask Mr. Robertson, of the Eastman Kodak Company, to start the ball rolling.

J. A. ROBERTSON: In keeping up interest we must devise new methods of rousing attention and enthusiasm. We must constantly think out fresh schemes to interest the men. We must not sink into a circumscribed rut. You cannot interest men in accident prevention without interesting them in

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other things along the same line. Such new plans as are evolved, however, must spring from the sincerity of the heart, because if you do not have the heart for a good foundation, you might as well have a religion without a Bible and without a creed. So far as concerns the economic side of the question, I think the late Elbert Hubbard laid it down that "A thing which is not economic is immoral." Let me qualify that somewhat—let us put it this way: "A thing which is fundamentally right must, if efficiently demonstrated, be economic." So the economic side of this matter is simply the result of the fundamental principle that it was right to begin with. You must constantly evolve safety plans and ideas from the crucible of the mind We may do all that is humanly possible for the well-being of a tree; but it needs the changing seasons to round out its growth. So I think that the annual congresses of the National Safety Council take us out of our grooves and afford us a fund of fresh ideas for the stimulation of interest among our men, and for the general promotion of the cause to which we all swear fealty.

CHAIRMAN: A number of speakers have referred to enthusiasm in safety work. I know that nobody here doubts the importance of this precious attribute. The enthusiasm of my friend, Dr. Patterson, has done much to make this Congress a success, and I call upon him now.

DR. F. D. PATTERSON: In my capacity as president of the Philadelphia Safety Council, it has been my privilege to welcome you to this city. Now the time has come to bid you good-bye —to wish you Godspeed and good luck on your several ways. Last night our ex-president gave us a sermon which I feel sure everyone has taken to heart. I know that our cause is right, and I know that it is just, for, like the crusaders of old we march forth to conquer under the Cross as they did. I hope that every member of the National Safety Council will disseminate the message of these words on the back of our program: *"And the end is that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comfort of his arm in her age; that his wife shall not be untimely a widow; that his children shall have a father; and that cripples and helpless wrecks, who were once strong men, shall not longer be a by-product of industry."*

I feel sure that the Philadelphia Safety Council and the whole city of Philadelphia have had an inspiration and have seen a vision in the work which you have done here. And, as we close, let us all take home these lines of the poet:

I know that the problems that face us now
Are sore to our erring view;
But we've gained a sight of men and minds
That our grandsires never knew.

We have passed from the time when Might was Right
To the time when Right reveals
Some part of her face, divinely fair,
To the veriest clod who feels.

Through the long, slow eons we've upward crept
As ever our God hath willed;
And here has the right been crowned our king,
Or there has the wrong been stilled.

There is much to do, there is much to win,
But the ages have taught their lore;
And we clearer see what the right must be
Than ever man saw before.

The meeting was then adjourned.

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Safety First Federation

Forty Cities and Eighteen States Were Represented at the Detroit Convention

AT the first annual convention of the Safety First Federation of America, held in Detroit, on October 19 and 20, Darwin P. Kingsley, president of the association, in his presidential address remarked:

"The very center of the doctrine of this Federation and its allied societies is the value of human life. Its plea is 'Be Careful.' Why? Because you represent in yourself the value that gives all other things value. Safety First means that there is something in society vastly more important than success, more desirable than efficiency. If human life is to be jeopardized by haste, don't hurry. If human life is to be sacrificed by speeding up efficiency, be less efficient. If the human body is to be maimed or destroyed in order to secure speed and power, get along with less speed and less power. This doctrine is not merely sentimental; it is more than a reflection of the woe and heart-break that follow the cruel strokes of industry and traffic.

"On business considerations alone it is to be rated among the soundest and sanest movements started within our time.

"We have long been responding to the impulse which lies back of this movement, but we have been working at the wrong end of the problem. Consider what we constantly do when appeal is made on behalf of the inefficient. We tax ourselves both privately and through established authority in order to preserve and protect lives that have always been useless, or through some industrial stroke or accident have become useless. We tax ourselves to take care of the insane and we look in a sort of haphazard way after the criminal classes. But when we face the conflict of life we change our whole point of view. Our goal is success and not safety, and success as a goal is a fine thing, but in the eagerness of our quest we strike right and left, we charge, and if in the process we have stricken somebody down, or trampled on somebody, or gravely crippled ourselves, we find it out usually when it is too late. Through haste, through following the fighting instinct, through utter concentration on our work we probably destroy needlessly and unintentionally more value in the process of production than we restore afterwards by all our public and private charities.

"Safety First, therefore, is good business. Safety First means that no business achievement is worth while that needlessly sacrifices human life. This Federation cannot wholly stop the slaughter that now takes place daily upon the streets of most of our cities. The vicissitudes of life will continue to take their toll, but the immediate purposes of this organization will not have been achieved until the murder of children and the maiming and killing of the efficient has been reduced to a minimum."

RESOLUTIONS ADOPTED BY THE FEDERATION.

Delegates and associate delegates, representing about 40 cities located in 18 States, the District of Columbia, and the Dominion of Canada, attended the Federation convention. The resolutions adopted urged safety practices in the various activities of everyday life, especially in street traffic, fire prevention and automobile regulation. The substance of the principal resolutions is subjoined.

Auto. Photo. Law.—The impelling motive which called the Safety First Federation of America into existence is the conservation of life, limb and property and it is self evident and conclusive that no traffic regulation can

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be productive of the aforesaid results without the licensing of all motor operators (owners as well as chauffeurs) based on the strict examination of moral, mental, and physical capacity and then the strict identification of the licensee in order to insure that the operator who sits at the steering wheel of any motor driven vehicle is the party who is examined and none other; and whereas, after mature study, it being our conviction that no other adequate or certain means of identification other than the photograph attached to the license card has been suggested. Be it resolved: that the Safety First Federation of America in annual convention assembled expresses as its sense the vital necessity for an Auto. Photo. Law, which will provide for the above requirements and it urges upon every State in the Union, as well as on all the provinces in the Dominion of Canada, the passage of necessary laws which will bring about the adoption of the examination of all motor car operators, with photographic identification as conditions precedent for licensing; be it further resolved: that the Auto. Photo. Law is the necessary basis on which all effective traffic regulation must proceed in order to effectively minimize the possibility of accidents and thereby safeguard life, limb and property.

Fire Prevention.—We strongly recommend the enactment by municipal legislative bodies, or by State legislatures where the local legislative authorities are without the power to enact such legislation, of laws making it a penal offense for any person to drop or throw away a lighted match, cigar or cigarette inside or from a building or in any inclosure in which people assemble, except into a proper receptacle. We also urge the enactment of laws or ordinances prohibiting the use of "strike anywhere" matches; that is to say, matches which may be ignited upon any surface other than the surface prepared for that purpose on the box in which the matches are originally contained. We further recommend that the striking surface on paper or card match folders, used for advertising purposes, be placed on the opposite side of the folder from that to which the matches are attached.

Safety Zones. — Every municipality should so far as it is possible and necessary, designate by white lines or otherwise, safety zones and crosswalks on its streets, and should empower its police officers to restrain pedestrians from crossing streets so marked except at the designated crosswalks and that such designated areas be kept free of all obstructions which might interfere with their proper use by pedestrians.

Other declarations for the protection of life and limb, adopted by the Federation, at the Detroit meeting, were to the following effect:

The enactment of laws prohibiting the sale of dangerous weapons and explosives for avoidance of injuries to persons and loss of life from tetanus.

The enactment of laws providing for the dispensing of poisons in receptacles distinguishable in the dark by form and by both form and color in the daylight as a safeguard against accidental poisoning.

An operator who shall be found guilty of driving a motor vehicle while under the influence of intoxicating liquor should be deprived of his license for at least six months, and in the case of a repetition of the offense, he should be permanently disqualified from driving a motor vehicle thereafter.

TELEGRAMS EXCHANGED WITH THE NATIONAL SAFETY COUNCIL.

PHILADELPHIA, Oct. 19, 1915. Darwin P. Kingsley, President, Safety First Federation of America, Detroit: I take pleasure in transmitting to you the following resolution: "Resolved that the National Safety Council, assembled in its Fourth Annual Congress at Philadelphia, extends its felicitations and best wishes to our co-laborer, the Safety First Federation of America, for the success of its conference now in session at Detroit, pledging it in the name of humanity our cordial co-operation in our common cause of safeguarding human life; and, in compliance with

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the suggestion offered by the committee of the Safety First Society of Greater Detroit, the president of the National Safety Council is hereby authorized and directed to appoint a committee to confer with the Safety First Federation of America as to ways and means of securing greater co-operation between the two organizations, hereby inviting the Safety First Federation of America to appoint a similar conference committee. Be it further resolved that the secretary immediately telegraph a copy of this resolution to the President of the Safety First Federation of America at Detroit." W. H. CAMERON, Secretary.

DETROIT, Mich., Oct. 19, 1915. W. H. Cameron, Secretary, National Safety Council, Philadelphia: Your telegram suggesting some program of co-operation between your organization and the Safety First Federation was duly received. It has been referred to the Committee on Resolutions, when it will officially be communicated to you in due course. D. P. KINGSLEY, President.

DETROIT, Oct. 20, 1915. W. H. Cameron, Secretary, National Safety Council, Philadelphia: Your telegram of the 19th has been read before the Safety First Federation of America in convention assembled and on motion duly made and seconded, it was ordered that the kind sentiments therein contained are heartily reciprocated. Full authority has been given to the Executive Committee of our Federation to confer with the special committee that you have appointed for that purpose to meet at such time and place as may be convenient for both committees. DARWIN P. KINGSLEY, President.

Poisons Used in Rubber Industry

RUBBER manufacture involves the use of numerous poisonous substances, of which lead salts, antimony pentasulphide, aniline oil, carbon disulphide and carbon tetrachloride are the most dangerous. The operations involving exposure to these poisons, however, employ but a small proportion of the workers. No women and very few boys are engaged in such operations. A lesser danger is found in the use of coal-tar benzol and of various petroleum products, such as naphtha, benzine, etc. A considerable number of the workers, including women and boys, is exposed to the fumes of these compounds. These facts are brought out in an investigation by Dr. Alice Hamilton for the United States Department of Labor.

While it was impossible to get complete data as to the frequency of industrial poisoning in the rubber industry, records were secured of no less than 66 cases of lead poisoning which occurred in 1914 among the rubber workers in the United States.

The dangerous nature of some of the compounds used in the rubber industry is not yet commonly known, so that cases of industrial poisoning may occur without being recognized as such. Also, in the case of some of the compounds, the symptoms of poisoning may be obscure or may not develop until some time after the exposure has taken place, so that again the resulting harm may not be ascribed to its true cause.

The investigation on which the bureau's report is based covered 35 rubber factories, located in 15 cities or towns in 9 States. As there are many trade secrets in the manufacture of rubber articles, it was impossible to make the investigation as complete as was desired.

There is a great difference in the extent to which men and women employed in the different branches of rubber manufacturing are exposed to the danger of poisonous dusts and fumes. What would be true of the manufacture of footwear would not hold for the manufacture of rubber toys and balloons, nor of rubber syringes and fountain pens, nor of tires. Not only are there great differences in the processes, due to the different kinds of goods made, but differences depending upon the theories of the manufacturer and the quality of the goods.

It is possible to equip and manage a rubber factory so that exposure to the various industrial poisons will be reduced to an insignificant minimum.

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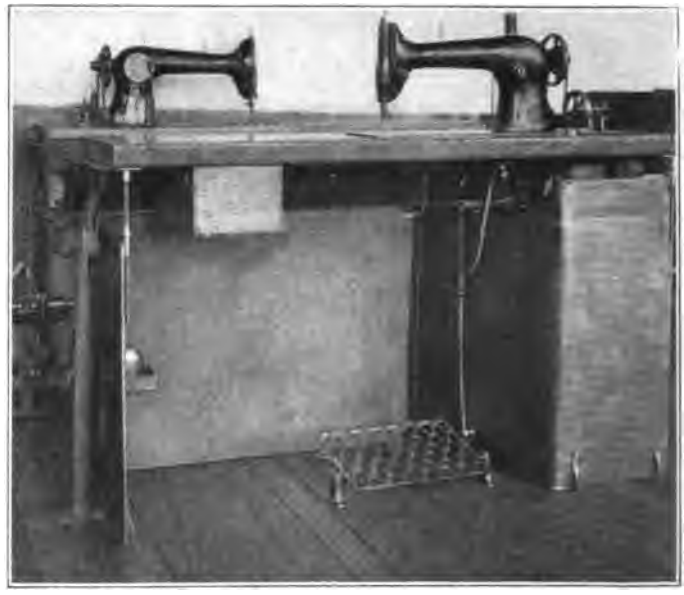
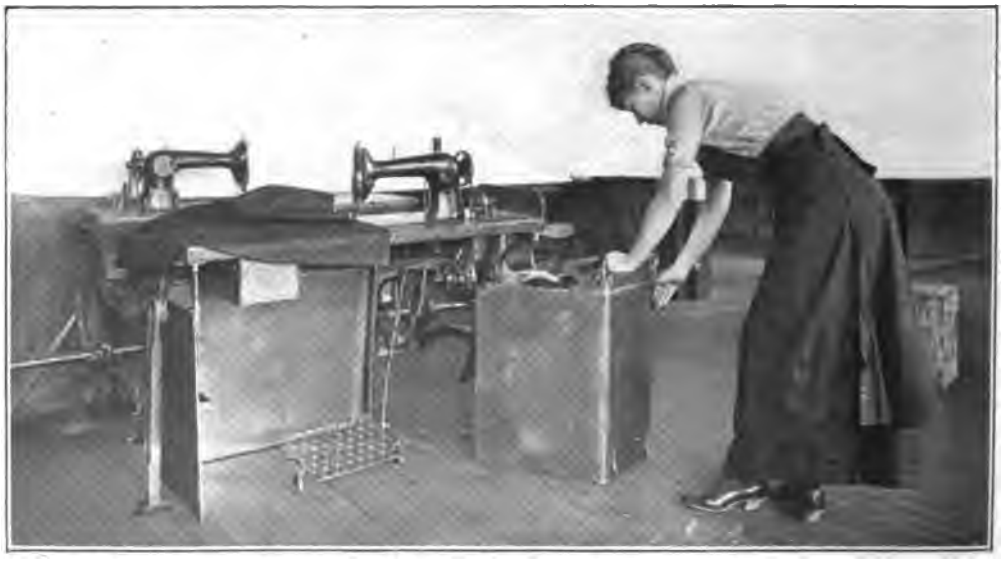
Sewing Machine Transmission Guards

TO the layman a sewing machine would seem to present very little hazard. It is a fact, however, demonstrated by casualty records, that numerous accidents do occur in connection with transmission machinery on sewing machines. An effective form of guarding the danger points is indicated in the accompanying pictures. The substantial manner in which the guards are constructed and the easy means of access they afford to the vital parts of the mechanism, for oiling and adjustment, in addition to the absolute protection they afford, should prove a lesson to the objectors to guarding that class of machinery on account of its assumed non-hazardous character.

As stated, accident records show that many and serious accidents occur to operators in the clothing industry. Their clothing and, often, in the case of girls, their hair is caught in the moving transmission. The pictures indicate how the hazard may be eliminated. Such elimination affords safety to the employes and thereby a reduction in the compensation insurance rate. In addition it gives a more orderly aspect to the shop where installed. There is every reason for the general use of the protective devices shown below.





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"Carelessness," or Incorrect Accident Classification?

By H. W. Mowery

IS it possible that human beings through their own "carelessness" cause injuries to themselves amounting to over 80 per cent of the total casualties in our industrial life? This charge is common. It was made repeatedly at the recent congress of the National Safety Council at Philadelphia. It is difficult to believe.

In this light it is interesting to note, simply as an example, the following analysis of casualties as recently mentioned in SAFETY ENGINEERING:

	Per cent
Carelessness of injured	71
Miscellaneous	24
Carelessness of others	3
Lack of mechanical guards	2
	100

Is it a fact that only 2 per cent of a general list of casualties in a large industrial plant could have been prevented by suitable mechanical or rather material safeguards? Is there not an error, perhaps of judgment, in classifying at least some of these accidents? Is it not still more likely that something is wrong with general methods of classification?

The aim of the "Safety First" movement is the elimination of casualties, but accident prevention is far from being an exact science, because accident classifications are not explicit. Not only are present classifications misleading on account of the causes of accidents not being clearly shown, but in many cases casualties are erroneously charged under vague general headings because there is no specific class in which they may be entered. The result is "confusion worse confounded."

Before accidents can be eliminated the *immediate* causes of those accidents must be removed. Before the causes can be removed they must be known. And in order to know them it is essential to classify casualties in such manner that there is no doubt as to their causes. When this is done, there will be a readjustment as to the relative seriousness of many hazards. Some causes, now little heeded, will appear in their proper rank and will then receive the consideration necessary to insure their elimination, with a consequent important reduction in total casualties.

Already, figures have been obtained which tend to show startling differences from existing ideas of the relative importance of various hazards. The coroner's office of New York City, for the year ending December 31, 1914, in Manhattan alone, recorded 65 deaths from fire, 53 from surface cars, 12 from subway and 12 from elevated cars—a total of 142. But contrasted with this total from four well known hazards, two of which are usually considered especially serious, were 68 killed by falls on sidewalks and 102 by falls on stairs—a total of 170, of which more than 50 per cent were caused by slipping. Death by fire is spectacular. It is widely advertised, while death caused by a broken neck or concussion of the brain through a fall from slipping is a commonplace matter. However, a comparison of the above figures gives evidence of the seriousness of the slipping hazard which is seldom considered.

Exception, no doubt, will be taken to the use of the slipping hazard, as an example in this connection. There are many who take the position that anyone injured through slipping, has not been sufficiently careful. That is indeed true. Lack of sufficient care is no doubt a *predisposing* cause of nearly all casualties, but *a material condition is the immediate cause*. The few exceptions may well be classed under that phrase frequently noted on old bills of lading, "Acts of God." We cannot expect to remove all the sundry contributing and predisposing

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causes of accident, but if the immediate causes are eliminated the advance toward the goal of absolute safety, though probably never reached, will be accelerated greatly.

What really are the causes of, let us say, "Injuries getting on and off elevators?" Some there may be who think that, as they have stepped on and off elevators thousands of times without injury, it must surely be the carelessness of the injured person when there is a casualty. I do not contend that greater care on the part of the injured one, would not have prevented the accident; but I do maintain that the casualty, in all probability, could have been prevented by some mechanical or material means. Was it caused by poor light, car floor not flush with building floor, car starting too soon, or more particularly by slipping upon the floor or the iron or steel floor inserts? These and other causes of similar accidents can be eliminated by mechanical or material means. In a certain large office building in New York City there was an average of about four accidents per week for a long period, occurring to persons stepping out of elevators. Finally the superintendent of the building "saw the light." An anti-slip surface about 18 inches wide was placed on the floor landing along the entire bank of elevators. Since then there has not been a single casualty. The *immediate* cause of accident, slipping, in this case, was removed by material means.

"Injured on stairs" is another good example of classification that does not even make a pretense at showing a cause. Absence of handrails, poor lighting, improper tread and riser dimensions and other purely material defects are some of the causes of stair accidents. But the principal immediate cause is unsafe treads. They are a positive menance. Upon a single stairway in the Pennsylvania Railroad Terminal at Philadelphia there were 21 casualties in six weeks. This stair was equipped with a type of "safety" tread having a smooth metal nosing edge and heel-catching grooves parallel to that edge. No doubt many statisticians would have claimed that these casualties were caused by the carelessness of the injured. However, the safety experts of the Pennsylvania Railroad reached radically different conclusions with decidedly favorable results. Investigation showed that people descending the stairs would slip on the metal nosing edge, the front edge of the heel would catch in one of the grooves throwing the person forward, frequently striking upon the head. The predisposing causes on this particular stairway were many, including haste or carelessness, but the immediate cause was unsafe treads. That type of tread was replaced by an abrasive-metal anti-slip tread, having an anti-slip nosing and no grooves parallel to the nosing. At once the accidents ceased and during the time records were kept (the following three months) not a single fall was reported. The change eliminated the danger to the pedestrian unable subconsciously, to discern clearly which of the lines running parallel to the nosing edge was the line of the step edge. But more important still, it removed the immediate cause of accident in the slippery nosing edge and heel-catching grooves. From 21 casualties in six weeks to none in three months or longer, is conclusive evidence of the importance and desirability of safe treads. Moreover, it should be noted that the predisposing causes were still present after the change of treads but the immediate cause having been removed by material means, there were no further casualties.

The same principle can be applied extensively. In the case of a rapid transit company, operating in the Metropolitan district, there were practically no casualties in train accidents in a year. But in other than train accidents there was a total of 138 persons injured. Eleven were employes and the remaining 127 passengers. This surely emphasizes the public hazard, but the natural question arises as to how 127 passengers were injured on this small line in other than train accidents. Investigation showed that 39 per cent of them were injured on stairs; 18 per cent injured getting on and off cars at stations—minor injuries caused by being struck with the sliding doors, tripping, etc; 16 per cent were classified as miscellaneous, the remainder

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being divided among two or three minor general classes. An inspection of the stairs by an expert in that line revealed that many of the predisposing and contributing causes of accident had been eliminated but the immediate cause was still present in unsafe treads.

In that section of New York State known as the First Public Service District, each year there have been more than 20,000 persons injured "alighting from and boarding cars." This is only a little less than one-third the total number of casualties of all kinds on railroads, street car and rapid transit lines in that district. What are the immediate causes which should be removed to eliminate or at least reduce these casualties? Let the classifications show explicitly the immediate causes and a material means of correcting the hazard will be found.

Considering the subject from an industrial point of view, it is even more difficult to obtain satisfactory statistics. However, the same general principles apply to this type of casualty classification. Immediate causes of accident must be removed before casualties can be prevented. It is not sufficient to say that the "carelessness" of workmen is responsible for injuries to themselves.

There may be carelessness also on the part of many responsible for the safety of others, in that they do not dig deep enough to uncover the actual immediate causes of accidents but prefer to adopt the easiest method and "blame it on the workman's carelessness." But the real solution of the problem and the only effective means of preventing accidents will come in discovering the immediate cause and classifying accordingly. Material means to prevent recurrence of similar accidents can and will be found when classification points out the causes properly requiring elimination.

Transmission Machinery

THE State of New Jersey, Department of Labor, has issued specifications, prepared by Lewis T. Bryant, Commissioner of Labor, for standard safeguards of all kinds for transmission machinery and individual machines, and in particular for machinery safeguards for transmission machinery. The safeguards are divided into four classes, depending on the use for which they are intended.

Standard guard No. 1 is a railing to be used only when placed 18 inches or more from any moving part. Specifications are given for its construction.

Standard guard No. 2 gives the specifications for guards 4 feet or more in height fastened to the floor and without other support or bracing.

No. 3 is to be used for guards no dimension of which is greater than 3 feet, or for larger guards which can be supported or braced every 3 feet, and in other cases when specified by the commissioner.

Standard guard No. 4, or gear guards, shall be constructed of perforated or sheet metal not lighter than No. 22 gage, or of any of the filling materials approved by the department with suitable angle iron or similar reinforcement.

The standards given for machinery safeguards on transmission machinery include specifications for set screws and collars; keys and keyways; couplings; methods for stopping machines and shafting in case of accident; guards for overhead transmission and low transmission machinery; gears and regulations for inspection of machinery.

The pamphlet contains three pages of plates illustrating the requirements for various guards, and there are a number of photographs showing different types of protection used in a number of plants in New Jersey, taken by permission of the following firms: A. B. See Elevator Company; P. Lorillard Company; Safety Car Heating & Lighting Company; Charles H. Scammell & Company; Sterling Ribbon Company; Frank & Dugan; Benjamin Eastwood Company; Brilliant Silk Company; Victor Talking Machine Company.

The Department of Labor further recommends that all safeguards should be painted green as this is rapidly coming to be considered symbolical of safety.

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Bear-in-Mind "Safety First"

THE Merchants and Jobbers Association of La Crosse, Wis., organized a Safety Round Table several months ago. Louis W. Silbersmith is president, and J. M. Storkenson, secretary. The organization has been up and doing since its formation. Meetings have been held and lectures delivered by prominent speakers. La Crosse is one of the liveliest and most enthusiastic "Safety First" cities in the country. The Round Table lets no chances slip by. It was on the job, boosting safety, at the Interstate Fair at La Crosse, September 28 to October 2, inclusive. The accompanying photograph shows the exhibit of the association in a tent on the fair grounds. Two men explain the exhibits, which were furnished in part by the National Safety Council and the Industrial Commission of Wisconsin. A correspondent of SAFETY ENGINEERING writes:

"As 'Safety First' is a rather dry subject to the general run of careless human beings, the crowds did not attend the first day in great numbers; but, through the wit and resourcefulness of the Round Table executive committee, Messrs Conway and Storkenson, a scheme was devised to gather in the crowds. We have all heard the slogan 'Bear In Mind Safety First.' The picture explains the rest. The crowd was large during the subsequent days. Many persons learned a few things they had not known before, among them that the Safety Round Table of the Manufacturers and Jobbers Association of La Crosse is back of a tremendous effort to establish safe and sane practices not only in the factories but on the streets, the farm and everywhere else in every day life."

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"The Man on the Job"

Prevention of Accidents By Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize of $10.00 *and one Second Prize of* $5.00 *for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 196

MONTHLY SAFETY BULLETINS.—As has been agreed by many safety engineers the most important problem of accident prevention is educating workmen to be careful. One of the most efficient mediums through which this can be accomplished, and in many cases the families of workmen also reached, is the monthly safety bulletin. Many companies are now distributing these little pamphlets to their employes.

About two years ago permission was given to me to publish such a bulletin, and shortly afterwards the first issue was published. It was 6 x 9 inches and consisted of 4 pages. After three numbers of this size had been distributed and the ideas of the men gathered in, it was learned that the men had to fold the bulletins to get them in their pockets and as the paper was glazed it cracked and split. Our printer then advised us that by reducing the size of the bulletin to 5 x 7 inches, so that it would readily fit in the pocket, we could print 16 pages, just enough to fill a printer's form, at a slightly higher cost. It was decided to do this. At that time, having long realized the importance of photographs to teach safety lessons, it was planned to publish series photographs illustrating all rules in the rule book, giving the rule in six languages under each illustration. The halftones were ordered of a size to be used later in illustrating the rule book, as the conclusion had been reached that a rule book of this kind would be much more effective than the ordinary rule book. Although our rule book had been carefully prepared after a study of many such books used by other companies and consultation with heads of all departments, it was decided that it was not as comprehensive as it should be. In order to correct the defects and present the old and new rules in an entertaining manner, an exhaustive study was made of the practices of each department and published each month under the superintendent's signature. Particularly dangerous conditions and important rules were illustrated to call special attention to same. The foremen of shops were also invited to send in "Don'ts," to govern practices of men working under them. Prizes were offered through the bulletin to stimulate suggestions to prevent accidents by elimination of dangerous practices and installation of safety devices. In this way during a period of two years the entire industry has been covered in quite a thorough manner.

In order to drive valuable pointers home slogans were run at top and bottom of each page. An editorial covering some important subject, a page devoted to "Causes of Accidents and Their Prevention," and two pages devoted to medical and hygienic subjects were also featured each month. This rounded out the bulletin and made it cover all items of general interest in accident and disease prevention. The subjects were presented in simple language, briefly yet thoroughly, each word being carefully weighed. Reports of the Fellowship Club and also items of general interest have also been published, and in one recent number forty-eight illustrations of safety rules were published.

It is believed that these bulletins are interesting, attractive, practical and economical and do much to aid in accomplishing the desired results.

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No. 197 EDUCATE THE MAN THAT OWNS THE JOB.—It is my intention, with the editor's permission, to call the reader's attention to some facts gleaned from my experience as a factory inspector. One is that The Man On The Job would be better educated if conditions were reversed—namely by educating The Man That Owns The Job first. There are exceptions, as all inspectors know, when workmen will "take a chance," and will violate rule and law to operate machinery with guard removed and in an unsafe condition; but, as a general thing, I find that the proper guards have not been provided as a few excerpts from "follow-up" letters, further on in this article, will show.

The Man On The Job articles are instructive and I study them closely, and gain considerable information from them, but 90 per cent of the articles elaborate on how to educate the workmen.

I do not recall an article where an attempt has been made to show the factory owner "the error of his ways," and thereby tend to lighten the burden of the man who is really "on the job," namely, the factory inspector. I am writing as one of them, one of the many who, as viewed by some of the factory owners, enter the plant with "horns" and leave with "curved" toes and an "arrow-tipped" rear appendage. By other factory owners, the inspector is received with a hearty welcome and an indifferent good-bye. By possibly one in one hundred, he is received as a man of merit, a good fellow—"glad to have him around." Generally speaking, to be a factory inspector is everything that General Sherman said war was.

Now to prove all of this:

I am sent to inspect the plant of the Anonymous Manufacturing Company. On arriving there I make myself known. I am told to wait until Mr. So-and-So is notified of my presence. I wait. I wait some more. I again make an appeal. My presence has been forgotten. Finally Mr. So-and-So advances. I tell him my mission. He seems surprised that he should be bothered with such a small matter. He tells me that he is awfully busy today and invites me to call again tomorrow. I object to this, as today, too, is my busy day. I tell him that it will not be necessary for him to accompany me through the factory. Some one not so busy will do, but I would like to interview him for a few minutes in order to get information necessary to complete my records. He can now see that I am bent on my purpose, so he wilts just a trifle. He asks me how long it will take. I tell him. He tells me to "shoot," but each question is parried skillfully and I question his veracity, but take it for granted that his answers are "officially" correct. I am now ready to enter the factory and in doing so I note that he is not too busy to accompany me. On arriving there I find that the real tug-of-war is on in earnest. I find the factory away below the average; an old one, so to speak. Machines, while doing the work in a satisfactory manner, are away below standard in the matter of safeguarding. I begin to make suggestions for the better safeguarding of the plant. I show different methods and styles. I explain how home-made guards can be satisfactorily applied. I appeal to reason. I endeavor to show that his workmen's only assets are their limbs intact. I attempt to picture, in my own way, how easily a man could accidentally become entangled in the open gears, unguarded beltings, pulleys, etc., but I cannot make him see it that way. He tells me that to place guards here and there as suggested would mean curtailment of output; would make the machines useless, consequently he would not attempt to entertain any of my recommendations. I leave the plant, but it takes considerable time for my general anatomy to reach a normal temperature. The plant (for the present) is hopeless. I imagine that I can plainly see the skull and crossbones indelibly stamped over the factory entrance.

Plant No. 2, inspected the following day, is that of A & B. Company. I present my card and pass a word of greeting with the official in charge. He

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appears glad to see me. He answers all questions promptly—whether correctly or otherwise, I have no means of knowing. We enter the factory proper and I find same to be about 50 per cent guarded; that is, some effort has been made, and while crude and not up to a safety standard, it takes the place of a "keep off" sign. I make my usual recommendations and am informed that all such recommendations will receive prompt attention. There is no chance for an argument here, although I go the limit. I am all through. I am asked if I smoke. Yes. All right, have a cigar? I fall. Casey, I am informed, keeps a thirst emporium on the corner. I am game. We shake hands, and part as all "good fellows" should. I think "Here is one plant that will be a model shortly," the plant is "followed up." Alas, word comes back that some of the recommendations have been attended to; others will be done "just as soon as we can get 'round to them"; others are utterly impossible, some are considered impractical and will not have attention!

Plant No. 3. The following day, the boss assigns me to inspect the plant of the Blank Manufacturing Company. I start off, and on arriving at the factory I am ushered in to Mr. Blank's private office. He gives me the "once over." I am invited to take a seat. I do so. I spar for an opening. He swings, I counter, we clinch. When time is called, Mr. Blank informs me that he wants his plant inspected. He wants the benefit of my experience in such matters in order that his plant may be made foolproof. He invites me to go the limit. He calls Mr. A (the man whom he has assigned to carry out the inspector's recommendations). We are duly introduced. Mr. Blank gives me all desired information. He does not even trust to his memory but calls in his clerks to get the information accurate. Mr. A and I enter the plant. I find that it is a large one. We scrutinize every machine. We enter every nook and cranny. We miss nothing. We go into minute detail. Sketches are made which will be used by Mr. A. My portfolio is searched for cuts and photographs, as an aid to him in his work. My inspection is finished. I call at the office, and so inform Mr. Blank. I inform him that a detailed report of my inspection will be forwarded to him. He thanks me, and I depart. The report is duly forwarded. After, possibly, 90 days I am ordered to make a reinspection. I do so with pleasure. I meet Mr. A. We again go through the plant, and check up. I now find a 90 per cent plant. The guards are close fitting, neat and substantial. I find "penalty" signs on each guard. All unsafe practices have been abolished. Safety organizations, and fire drills have been organized. Sanitary conditions have been improved. A club room has been provided for the men, and a rest room for the women, each finely equipped. Working conditions and hours have been regulated. The employes look happy, and the change in such a short time is indeed marvelous.

Now, Mr. Factory Owner, these are three conditions I encountered in as many days. In which class are you?

Now come a few excerpts (the result of follow-up letters), from the owners of factories that were inspected. I copy only a few, but I have scores of them to choose from.

No. 1. "I cannot comply with your inspector's recommendations. If I did I should have to go out of business. He does not seem to know much about the———business or he would never make such fool suggestions. My machines are all right and I know enough to handle my own affairs."

No. 2. "That machine has been running that way for twenty years, and no one has ever been hurt on it yet."

No. 3. "I have guarded the belt on the———and put a railing around the pit. I will put a railing on the stairs when I get around to it but I will not put a guard on the gears of the——— machine. I can't see where that is necessary. If any of my men get their hands in there, it's their own fault, and they ought to have their hands taken off—if they do."

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No. 4. "I have just had my elevator fixed up, new cables and everything, and if I have to make changes, in order that some grafter may hold his job, I will—"

No. 5. (Here is where I got mine!): "Some of the matters you mention will be attended to during the process of reconstruction. Many of the recommendations, however, are so absurd as to be impossible and so amateurish as to be unworthy of serious consideration. The man who made them is evidently ignorant of the necessities of a ———plant operation, a fact which he seems to have undertaken to cover up by a multiplicity of recommendations." Whew!

No. 6. (Here is another corker!) I have made no improvements or changes called for by your inspector. Your inspector, who came here while I was away, doubtless knows nothing about printing machinery from the recommendations he made. For instance the balance wheel on the cylinder press—who ever heard of a balance wheel being boxed in 6 feet high? The flywheels on the job presses do not need guarding, as we can stop them with our hands at any time. They are run by friction-drive small motors and slip if hardly touched. As to handrail to basement—a man could not fall off here if he wanted to, as the side of the building goes down so far. My plant was thoroughly inspected last fall, by a man who knows his business, and he said it was all right," etc.

No. 7. (Here is one in one hundred). "The list of recommendations made by your inspector, after going through our factory recently, was duly received. They are placed in the hands of our engineers, with positive injunctions to see that each and every one of them is carried out. We desire to thank you for the interest you have taken in our plant, same being highly appreciated. As soon as the recommendations have been completed we will so advise you," etc.

Now, do you not think that the "education" of The Man That Owns the Job is just as important as that of the Man On the Job? It should be our duty, through the medium of SAFETY ENGINEERING, to attain that end.

❦ ❦ ❦

No. 198 THE ELIMINATION OF HAZARDS BY THE MACHINE DESIGNER.—While we teach men the dangers of a machine, and also make elaborate guards and safety devices after we receive and install a machine, why not begin our safety campaign with the design of the machine itself, and not treat safety as an after consideration, as we are inclined to do?

It is almost always possible to make all guards integral with the machine, as it may even be possible to remove the hazardous part from its objectionable position and completely inclose it within the machine frame. It may be possible in some cases to devise an entirely automatic feed for the raw product, thereby removing the necessity of an operator touching a dangerous part.

This, then, becomes the machine designer's part in the interest of safety, and he should be a student of safety engineering, familiar with safety laws, methods and standards of safeguarding and their practical application.

Safety in machines should be studied by the designer, not because it eliminates dangerous mechanical features alone, which, of course, is paramount, but also from the point of increased efficiency in the machine and decidedly greater efficiency of the operator. An operator who is able to concentrate his mind upon his work without the disconcerting thoughts that he may at any time be injured, is obviously a better producer than an operator without that advantage.

It is not altogether an impossibility nor a disadvantage for the machine designer to consider this phase of engineering in the design of general or special machinery.

No better example of the safeguarding of machines is given than that shown by the machine tool builders. If you compare, say, a lathe or milling machine of 5 or 10 years ago with one of today, the future possibilities of the elimination of danger is apparent. We

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look at the old lathe, perhaps. The first things noticed are its cone pulleys shifted by hand while in motion, the change gears, feed gears or feed belt exposed, and feed shaft and screw placed too near the operator, the whole machine driven by tight and loose pulleys that are slow in action when stopping a machine if an accident does occur.

Now look at our latest lathe, driven by a single wide belt, possibly direct from the line shaft, the machine being controlled by a clutch operated from a convenient place, or it may be driven by an attached motor which is controlled from any point or points necessary. We look further to see change and feed gears, but they are completely inclosed, and we also find that the feed shaft and lead screw are placed further back from the operator, and, on the whole, we see a neater looking machine and one of decidedly better mechanical construction, efficiency and control, but above all, safe.

Special machinery should receive just as much attention for safety as a standard line of machines. The cost to a purchaser of a machine with guards incorporated into the design is usually less than the complete cost of a machine which must be guarded by the purchaser, and the latter guards no doubt will look "home made" and probably be not as efficient as one would like.

To stimulate the machine designer's interest in safety engineering the purchaser of a machine should consider safety as well, and not accept any machine or apparatus that does not comply with:

State or city safety laws,
Universal safety standards,
Underwriters' standards.

All that apply should appear in the specifications for the machine or apparatus; also in the specifications should be mentioned any hazard known to the purchaser that may not be covered by any standard. Wherever possible, machines should have automatic feeds for raw stock when dangerous and efficient start-and-stop control.

Specific rules cannot be formulated for a general and special line of machinery, but the machine designer should design with the thought in mind that a person will deliberately do the possible but improbable act that you are in doubt about guarding against. In other words, make a machine as foolproof as possible, yet accessible at all times.

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No. 199 THE COMPENSATION LAW—SAFETY AND WELFARE.—The compensation law, as passed by the legislature of the State of New York, gave to the workman advantages that he did not have before. In many accident cases, prior to the enforcement of the compensation law, employes who were injured while working for their employers, had only two courses to pursue—to bring suit or accept a direct settlement. In most cases the employe who sued received very little of the awarded amount after lawyers' bills and costs had been deducted. Ofttimes the case would be carried over from one court term to the next, until the injured one (tired of waiting and needing the money) would accept an insignificant sum to settle his claim—and be glad to get it.

The compensation law removed all of these erratic conditions and has made it possible for an injured employe to get a stipulated amount, according to the extent of the injury. It has removed the opportunity for unscrupulous lawyers to get more of the awarded amount than the injured man or woman. Since the enforcement of the law there has been created a "Safety First" movement of wide scope. This includes the placing of guards in all places where hazardous conditions exist.

Previously there had been no thought of guarding exposed dangerous conditions, on account of the expense involved.

It has been shown by statistics that the placing of approved guards at exposed places has cost considerably less than the amount paid for lawsuits and settlements, for a corresponding length

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of time, when the danger spots were not guarded.

It is plain, therefore, that accidents will be reduced to a minimum, and many thousands of dollars saved by employers, when every known exposed danger point is guarded, as recommended by safety engineers and inspectors.

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No. 200 NOTES ON SAFETY IN THE GAS INDUSTRY.—We have found that an excellent way to prevent accidents is to place on the proper person's shoulders the responsibility for each accident, if it is possible to do so. We have arranged a system by which many of our men are paid according to the results they make, and, in making up the awards, consideration is given to the accidents, or the lack of accidents, and the condition in which the men keep safety devices.

An instance of the latter: We provided all of our street foremen with goggles for use by men cutting asphalt and cast iron pipe. In one of the inspections of tool outfits, it was found that one foreman had stowed his goggles under a number of wrenches and hammers. Consequently they were useless. On that account the foreman lost a prize he would have won otherwise, and as the fact was known to all the other foremen we have not had since any similar trouble over the care of goggles.

We believe sincerely that the appeal to enlightened self-interest is the strongest appeal that can be made to any man, high or low. Badges, medals and letters of commendation are nothing compared to the extra pay or reward which goes with good work. The Navy found that out when it began giving increased pay for successful gun pointers and marksmen. It was all very well for a ship to fly the battle efficiency pennant and to have "E" marked on sleeves or turrets, but the increased pay given the successful men was what counted most.

Most accidents are someone's fault. If men clearly understand that they will suffer for accidents for which they are to blame and be rewarded for preventing accidents, an excellent beginning will have been made in the safety campaign. There is no denying the fact that with many men the safety committee is a butt for ridicule. Scratching matches on a "No Smoking" sign is sometimes thought to be the height of humor. But if men can be made to understand that the safety committee will reward them for good work or punish them for bad, a different viewpoint will be developed.

The mechanical devices and rules that have been worked out for safety are excellent, in many cases, but as *men* are more important than *things* the most important part of the safety movement is to get workmen to believe in it. All who have had experience with workmen know that this cannot be done by talks, cards, rules or signs. Self-interest is still the strongest instinct the normal man has and an appeal to which is the strongest appeal that can possibly be made.

Prizes for October Articles

First Prize. No. 195. *L. M. Stacy, Assistant to Secretary, Avery Company, Peoria, Ill.*

Second Prize. No. 192. *E. H. Hart, Inspection Department, Ocean Accident & Guarantee Corporation, Limited, Dallas, Tex.*

Honorable Mention. No. 191. *Frank H. Trego, Secretary-Treasurer, The Stonehouse Steel Sign Company, Denver, Colo.*

Other meritorious articles were contributed by R. E. Smith, Employment and Safety Inspector, Universal Portland Cement Company, Buffington, Ind., and E. L. Spriggs, Superintendent, Rome Manufacturing Company, Rome, N. Y.

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Comments by Members of the Committee

No. 195 is my first choice. As suggested by the writer, the manner of introducing "Safety First" methods in an establishment must be thorough and with the consent of the heads of the plant, otherwise there can be little or no desire on the part of employes who for years have escaped injury to change methods of working, or have additions placed on their machines even though they be for their benefit.

The writer of No. 191 has given some very good suggestions to employers who should take up the great work of "Safety First." The writer of No. 192 brings out some very good suggestions for the benefit of the safety inspectors.

I vote for No. 192. This article contains a very practical suggestion for helping out the real Man On The Job. I hope to see it carried into effect.

The writer of No. 195 is a man after my own heart. His ideas and mine coincide closely. I give him my vote for first prize.

My choice is No. 193. The writer describes clearly the part each one must play to prevent accidents and bring profits to the employe by protecting his life and to the employer by a saving in compensation costs and in uninterrupted production.

No. 191 strikes me as the best written article in the October issue. The statistics furnished are interesting. As the writer states "the show me" chaps must be convinced that a "Safety First" campaign in their plants will pay as an investment, before they will agree to guard machines or permit a "Safety First" campaign in their plant.

I vote for article No. 192. This article presents a suggestion which, if followed out, could not help but benefit the industries as well as the insurance inspection.

No. 191 deserves the leading place. I give him my vote because he has proven so conclusively by statistics and figures, that safety pays in dollars and cents as well as in every other way.

I favor No. 194. The writer points out thoroughly a simple and practical way for appealing to the men in the field. From my experience with large groups of men, I find that the writer's ideas are practical.

I cast my vote for No. 195 because I think that education is the best way to get results for the company you work for.

I select No. 191 as being the best article. The author presents convincing facts to prove his point, and shows beyond a doubt that "Safety First" does pay and pay well. Second choice I would give to No. 192, for the point he makes is applicable, not only to insurance inspectors, but to inspectors within the trades as well. Man grows by exchanging ideas, be it in the pursuit of safety or anything else.

I vote for No. 192, because some of his ideas are new, in asking inspectors in the several sections of our country to write to SAFETY ENGINEERING how they overcome obstacles in guarding machinery. I am sure this would be advantageous to us all, and assist us to become better inspectors.

My vote is cast for No. 191. Despite what others may say, there is no language so effective as cost figures for enlisting those not already serving in the cause of

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accident prevention. The importance of compiling statistical figures for those who are, and those who should be, interested in accident prevention, is not always appreciated. The splendid article by John Calder, on page 261, contains some compilations that enable one to see at a glance the situations requiring most attention. With such facts laid before us we know where to strike and with the item of cost before us we know why to strike. The cost statement given by No. 191 is consistent in comparison with such others as have been brought to my attention, but from the figures given there seems to be an error in the statement at the bottom of his tabulation giving $26,000 invested capital at 5 per cent for each employe. Checking the calculation I think it should have stated, for each injured employe, or $236.20 for each employe, which sum is certainly a staggering one.

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The author of No. 192 has the right idea of the "Safety First" problem. An inspector must be thoroughly acquainted with a plant in order to intelligently advise remedies for existing evils.

Cleaning Up a Factory

TO make "Fire Prevention Day" mean something in its factory, the National Cash Register Co. designed a poster, 5 by 4 feet, which was placed in conspicuous positions throughout the plant. On "Fire Prevention Day" the poster was supplemented with another bearing these sentences:

"At least 75 per cent of fires are preventable. All fires are the same size when they start. When the 'Clean-Up Whistle' blows Saturday morning, it will be a signal for you to clean out all rubbish, rags, waste paper and other useless material about your work benches, lockers and other places for which you are responsible."

Lockers and bench drawers that had been accumulating waste paper and rags for months were cleaned out. Truck loads of rubbish were collected.

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Railway Fire Protection

"Reduced Fire Losses Mean Reduced Operating Expenses"

THE second annual meeting of the Railway Fire Protection Association was held at the Hotel La Salle, Chicago, October 5, 6 and 7. About 125 members and guests were present. President F. H. Elmore, of the Southern Railway Company, Washington, D. C., presided and in his address he spoke of the success of the association. He acknowledged the faithful and valuable work of the various committees and dwelt on the possibilities of the organization. He emphasized the importance of the establishment of uniform standards for railroad fire prevention. In concluding, he asked for the continued co-operation of the individual members, expressing his appreciation of their help and counsel in the past.

THE slogan of the Railway Fire Protection Association is: "Reduced Fire Losses Mean Reduced Operating Expenses." The objects of the association are to promote the interest in and simplify the methods of fire protection and fire prevention; to obtain and disseminate information on these subjects and secure the co-operation of its members to prevent loss of property and life by fires and, especially, to standardize practices through the interchange of ideas and experiences with regard to such matters in connection with railway properties. The active membership is about 100, an increase of approximately 34 per cent in a year. Any railroad employe interested in fire prevention, regardless of the fact that he may not be in active charge of insurance and fire protection matters on his railroad, is eligible for membership.

The association was organized in the fall of 1913, after an informal meeting of railroad representatives at the annual convention of the National Fire Protection Association had decided that there should be an organization which would have the time and opportunity to specialize on railroad fire risks. The National Fire Protection Association had been in the fight for years, gradually extending its influence for better conditions, and, through membership in that body, many of the railroads had accumulated valuable information and advice; but, necessarily, the scope of the work of the N. F. P. A. was broad, and it did not specialize along railroad lines. Accordingly, the Railway Fire Protection Association was formed, and it is prospering to an unexpected degree.

The association has standing committees for all of the important branches of railroad fire protection and prevention, and it is the privilege of any member to take up knotty problems with these committees and receive their advice and recommendations on special questions that may come up. Thus, instead of relying upon the experiences gained and ideas developed on a single railroad, the members are constantly in touch with the representatives of all of the railroads, and are able thereby to obtain valuable suggestions and hearty co-operation on problems that arise.

At the Chicago convention more guests were present than members. The Rock Island, Southern Railway, Baltimore & Ohio, Colorado & Southern and several other lines were represented not only by their insurance departments, but in addition had fire chiefs from important terminal points present. The reports of the committees were instructive, and the discussions and general interchange of ideas that followed the reading of the reports, paragraph by paragraph, resulted in a dissemination of knowledge that could not possibly be gained in any other way.

GETTING THE OPERATING DEPARTMENT AROUSED.

The greatest problem confronting a railroad insurance department is getting the operating department aroused and interested in fire protection and prevention, thereby securing the co-operation of the officers and employes who actually make the wheels go round. During the past year the Railway Fire Protection Association has printed and distrib-

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uted among the operating department employes of the various railroads, pamphlets and circulars showing the standards of the association along various lines, backing up the recommendations made with statistical proof gathered by the Committee on Statistics. Interest bas been created by this system of publicity, and results are being obtained through the exercise of greater care in all classes of employment, with a corresponding decrease in the fire losses. The operating executives of the railroads have not only been attracted by the association's catchy slogan—that decreased fire losses mean decreased operating expenses—but they have seen the actual results of the work of the association, and have noted with appreciation the painstaking work done by the association's standing committees as evidenced by the annual proceedings. When the operating executives become interested in the work of the insurance departments, half the battle is won, as appropriations for increased fire protection are more readily obtainable.

ENGINEERS AT WORK ON STANDARDS.

In the coming association-year, the association is to undertake an elaborate piece of work, the compilation of a standard book of railroad fire protection and prevention. Dangers and remedies connected with railroad fire risks are to be dealt with by engineers and recommendations and suggestions presented, from a fire protection standpoint, for the construction of all standard railroad buildings.

COMMITTEE REPORTS AT THE CHICAGO CONVENTION.

Prevention of Fires and the Protection of Property.—The Report of the Committee on Rules and Regulations for the Prevention of Fires and the Protection of Property was in substance as follows:

Special consideration was given to the causes of fires, the conclusion being that ignorance and carelessness are the chief causes. It was recommended that the form already used by most railroads of printing the rules in bold type on heavy cardboard, posting them in conspicuous places, be followed in order to reach the masses of employes. It was advised that the language be mandatory rather than suggestive.

Fire prevention deals mainly with construction and arrangement of buildings and the guarding of hazards. Good housekeeping methods should be emphasized under authority to enforce a strict compliance. It should be impressed upon the mind of every employe that his duty is to conserve property by the elimination of the fire risk just as it is his duty to prevent destruction by any other agency. To create sentiment in favor of fire prevention is no small task. It means breaking away from practices that have grown to be a habit because of long standing. For instance, smoking in and around stations by employes and patrons causes many fires; yet, as a rule, these people feel that prohibiting this privilege is a serious interference with personal liberty. Like the movement for "Safety First," it must be proved to those called upon to take precautions that they will benefit thereby, in part, at least. A good point, and one which often convinces the men in the rank and file, is that lack of employment and consequent financial loss invariably follow in case of destruction of facilities.

Fire protection, in its broadest sense, has a threefold significance, embracing (1) the means for safeguarding or abolishing causes which originate fires; (2) provision of means which may confine a fire to the space in which it originates; (3) adequate means for fire extinguishment. If the doctrine that fire protection has to do only with the putting out of the fire were a safe one, it would be a simple matter to formulate rules under that head. It is considered wise, however, to accept and deal with the word "protection" in its broadest sense. The necessary means for fire extinguishment, always in readiness for service, is the final reserve when oversight or opportunity to prevent the hazard from starting a fire has failed.

The thought that should be ever present with those in charge of terminals and shop property is that fire protection must always keep pace with the growth of the properties. It too often happens that ter-

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minals, shops and other properties are enlarged without a corresponding increase in the fire fighting facilities. When the conflagration comes, the result is inevitable, for insufficient hose, limited number of hydrants and lack of water spell not only "oversight" but "disaster" as well. The committee submitted a draft of 24 rules under several heads, for consideration at the next annual meeting. These rules are to be considered as a foundation only and amplified to meet local conditions by the individual members.

The report was signed by members of the committee of which Robert Scott, Atlantic Coast Line, is chairman.

Fire Prevention and Protection in Terminal, Classification and Storage Yards.—The Committee on Fire Prevention and Protection in Terminal, Classification and Storage Yards classified the common dangers of fire in yards as: Sparks from locomotives, adjacent property, tramps and trespassers, burning rubbish, dry grass and weeds, spontaneous combustion. Other fire risks are: Doors of wooden cars left open, hay, rubbish, straw, paper, etc., left in cars; grass and weeds growing along storage tracks; tramps building fires on floors of wooden cars, smoking in same, etc.; trespassers, and small boys playing in and around cars; fires from adjoining property and storage of cars on dead tracks.

Methods of fire prevention as practiced by the Baltimore & Ohio System were described as tending to minimize losses from the foregoing causes. These include the removal of all hay, straw and rubbish from wooden cars, the secure closing of all doors, and storing no cars near hazardous risks or where they will be in danger of exposure from the burning of adjacent property.

Means of protection recommended include standard 2-way fire hydrants, 300 ft. apart on not less than 6-in. mains, with standard hose houses, each with 300 ft. of approved hose with nozzles, wrenches, bars, axes, lanterns, etc., to be installed throughout the yards where possible. Strings of cars should be cut in 10-car lengths with a distance of 20 ft. between each length.

Switching engines should be equipped with steam fire extinguishing device and hose such as the Nathan steam nozzle type or some pump type of extinguisher.

The summary of the report states that the protection of storage yards is one of the weakest features in connection with railway fire protection, for while many railroads spend large sums to protect their shop and warehouse properties, little or no provision is made to protect the car storage yards. In these days of retrenchment it is difficult to obtain authority for spending any considerable amount of money for fire protection purposes, and it is equally difficult to make the operating officers appreciate the necessity of adequate protection for storage yards.

Gilbert A. Hays, United States Steel Corporation, chairman.

Fire Prevention and Protection in Stations, Freight Depots and Warehouses.—The Committee on Fire Prevention and Protection in Stations, Freight Depots and Warehouses, W. S. Maryon, Southern Railway Company, chairman, reported that the precentage of loss in this class of property was high, containing as it does varied hazards, often buildings of flimsy construction, and isolated from protection other than limited hand equipment. Recommendations were made for the reduction of the losses by various means, including consideration of location and environment, proper construction, care in installing equipment, such as heating and lighting facilities and signaling systems. Attention was directed also to the proper care and maintenance of all properties, and making prompt repairs which may be necessary. Some special hazards were also touched upon, also the importance of adequate fire fighting apparatus and safety devices.

Cotton Hazards.—The Committee on Cotton Hazards, E. B. Berry, Southern Railway, chairman, made a report which, although of general interest, appeals more particularly to the cotton-carrying lines of the South and Southwest. Special attention was paid to the liability of the railroads for cotton in transit, and its inflammable character. Cotton losses for the year 1913, 10 roads reporting, were $165,540.32; for 1914, 13 roads reporting, $194,930.95. Statistics for five years show 56 per cent of cotton fires on

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railroads as flash fires caused by sparks.

The committee reported on the various kinds of cotton as fire hazards, and recommended a set of rules for fire prevention in the transportation of cotton. A report was made of the test of the system of the Cotton Protective Company for fireproofing baled cotton, conducted at Oklahoma City in April under the supervision of the manager of the Oklahoma Fire Prevention Bureau. Two ordinary 500-pound ginned bales were dipped in a chemical which is in the form of a paste mixed with water in the proportion of 1 to 15. The bales so treated were then touched with lighted matches, and cigars, red-hot cinders, etc., with no effect beyond a singeing or charring the surface exposed. The chemical does not injure the fiber in any way and protects the cotton from other damage, such as dry rot, country damage and weather conditions. It is claimed that cotton can be thus treated and loaded for shipment within an hour, and can be moved on flat cars as safely as in box cars. The Southeastern Underwriters' Association has offered a reduction of $1.16 per $100 on treated cotton with no objection to the use of flat cars. The committee urges that all cotton-carrying lines co-operate in encouraging the new treatment of cotton, not only for the purpose of reducing fire losses, but for what is of greater importance to the grower, the prevention of country damage and dry rot.

Hand Fire Extinguishing Apparatus.—The Committee on Hand Fire Extinguishing Apparatus reported that it had confined its investigations to the recognized forms of strictly hand apparatus, including only chemical extinguishers, water barrels and buckets, dry sand and the various forms of hand grenades and dry powder extinguishers. The committee urged the adoption of the chemical extinguisher and water barrels and buckets. The chemical extinguisher is preferred by 70 per cent of the railroads for extinguishing incipient fires, 18 per cent prefer the barrel and bucket, while the remaining 12 per cent divide the honors equally.

For many reasons, the committee said, it is well to select some special make and size of extinguisher as a standard, in order to simplify the carrying of repair parts, charges, etc., as well as to insure a thorough understanding, on the part of all concerned, of the use and care of the apparatus. In selecting a standard for use on rolling or floating equipment, account must be taken of the tendency of the usual loose-stoppered type to partially discharge through the mixing of the acid and soda ingredients, due to the motion to which it is subjected, so that the choice should be limited to the bottle-breaking type, or a specially constructed form of the loose-stoppered type, which partially overcomes the defect of the ordinary kind. All extinguishers must be inspected and charged carefully, and an annual test by hydraulic pressure is recommended in addition.

Dry sand is valuable in many cases for extinguishing fires involving oils or other materials not easily extinguished by water. It should be installed at all points where oils or paints are handled and form a part of the standard equipment on all roads using oil as fuel.

Niles Searls, chairman.

Oil Burning Appliances.—The Committee on Oil Burning Appliances, J. S Richards, chairman, submitted a set of rules for the storage and use of fuel oil. accompanied by plates illustrating how safe installations of oil burning equipment can be made and the reasons therefor. The committee was of the opinion that most of the railroads work from the standpoint of economy in the installation of oil burning devices, rather than to minimize the extra hazard created by the use of oil as a fuel, as most of the devices examined were of home construction along the ground lines of those found on the market.

There seems to be no set rule in effect governing the size or capacity of the regulating valves, which constitutes a source of increasing the fire hazard, as in many instances the oil control is rather crude, and could be materially reduced effecting a saving in fuel as well as reducing the fire hazard. The large increase in the consumption of fuel oil by various railroads, due mostly to the increase in steel rolling equipment, increases the fire hazard, and it seems important that set rules should be made governing the in-

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stallation and use of oil burning devices. The committee recommended the adoption of the rules of the National Board of Fire Underwriters as a standard for the installation of oil burning appliances.

Fire Prevention and Protection in Coaling Stations.—The Committee on Fire Protection in Coaling Stations submitted descriptions of the principal types of coaling stations in use, with a comparison of the life and cost of the different kinds of construction, concrete, metal and frame. The figures given indicate that a concrete chute for a 350-ton plant can be constructed at a saving of $8,500 over the cost of a wooden chute, with an increased life of 35 years for the former. The hazards of construction and operation of coaling stations were also described, and a set of rules for fire prevention and protection was presented.

A. D. Brooks, Illinois Central, chairman.

Electrical Hazards.—The Committee on Electrical Hazards submitted a detailed list of the hazards of electrical installations, the cause and effect of each, and a correction for each, according to the National Electrical Code. The rules of the code have proven practical. Fires attributed to electrical causes, upon investigation have shown that these rules have been disregarded. It is recognized that all electrical equipment in service has the latent power to cause trouble, and this must be guarded against. The one great cause of electrical fire hazards is poor insulation. A set of rules was appended to the committee report, the use of which will minimize electrical fire hazards. The final recommendation was to require all electrical work to be installed strictly according to the rules and requirements given in the National Electrical Code.

T. S. Potts, chairman.

Fire Prevention and Protection in Grain Elevators.—The Committee on Fire Prevention and Protection in Grain Elevators, Anson Murphy, chairman, described in detail the construction of all classes of elevators, tanks and dryers. The fire hazards of each were summed up, and methods of prevention and protection recommended.

Statistics and Forms.—The Committee on Statistics and Forms submitted statements from 41 roads, representing 100,769 operative miles, of the causes of fire and fire losses for two years, 1913 and 1914. The committee said that the gathering and compiling of statistics by a committee have proven unsatisfactory, and recommended that a paid statistician be appointed to gather such data as the association requires.

F. R. Austin, Chicago & Eastern Illinois, chairman.

Locomotive Sparks and Ash Pans.—The Committee on Locomotive Spark and Ash Pan Hazards made only a verbal progress report.

Railroad and Forest Fires.—At the morning session on October 7, F. A. Silcox, United States Forestry Service, Missoula, Mont., gave an address on "The Railroads and Forest Fires."

Officers, 1915-1916.—The officers of the association were all re-elected: President, F. H. Elmore, Southern Railway, Washington, D. C.; vice-president, Paul Hevener, Rock Island Lines, Chicago; secretary and treasurer, C. B. Edwards, Mobile & Ohio, Mobile, Ala. C. S. Sherwin was elected to the Executive Committee in place of W. L. Lawrence.

The Best Safety Device Is the Careful Man

By Edson S. Lott.

OUR fathers were not much wiser than the ancients. Until recently, an accident was rather a visitation of bad luck, an experience, like rain or drouth, quite beyond the control of man. In these modern days, what a change! The popular view now is that accidents are but neglects; neglects, largely preventable—for a non-preventable "accident" is not really an accident at all, but just a circumstance in the scheme of things. Largely preventable, I say, and to be reduced just in proportion as by education and precept and command the ordinary man can be taught to take care of himself. There is nothing more up-to-date than the declaration: "The best safety device known is the careful man."

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"The Fight Against Fire"

Conservation of Life and Property By Safe Construction, Fire Prevention Methods and Fire Protection

SAFETY ENGINEERING offers each month one First Prize of $10.00 *and one Second Prize of* $5.00 *for Articles, Suggestions, etc., relating to Safe Construction, Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 79 "No Smoking."—In going into many manufacturing plants we are met with signs or notices such as "No Smoking," "Smoking Not Permitted," etc., but how many of us stop to consider what a farce these notices really are?

We enter a shop, are met by the proprietor, manager, or superintendent, who will usually be smoking a nice perfecto. He will hand us one like it. We light up and parade through the shop, past any number of "No Smoking" notices; and this is, I believe, the nonsensical part of the whole system of placarding a shop with such notices as "No Smoking."

If it is dangerous and against good common sense rules of fire prevention (which it is) for John Smith, a $10 a week laborer, to smoke in the shop, why is it not just as dangerous for William Jones, the proprietor, or Thomas Blank, the manager, to smoke in the shop? Their 25-cent perfectos can and will cause just as much damage as John's 5-cent roll of cabbage leaves or cigarettes.

If they yield to the craving for a smoke, how can they blame John Smith for stealing a smoke on the sly, when he sees his superiors doing the very thing they tell him is dangerous? It is just as hard for him to do without smoking as it is for them. If he can do without smoking in the shop, why cannot they? If John Smith's smoking endangers lives and property, their smoking endangers lives and property.

Therefore, when a notice is posted, "No Smoking," let it mean no smoking for proprietor, manager, superintendent, laborer, visitor, and whoever may come into the plant. I believe the men will have more respect for a notice when they see their superiors leading the way in the Fight Against Fire.

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No. 80 The Mouse and the Match —It happened in a famous city in that region where the Great Pie Belt and the Great Bean Patch meet and intermingle, so that when one entertains a guest from that territory the question of pie for breakfast becomes paramount.

They were all "Thomases," these grave men who had met to consider The Fight Against Fire; men of action, some of them, in whose eyes swathings of oil and batting had lost their terrors, and to whose nostrils the odor of liniment was as the smell of the Balm of Gilead.

So it happened when one grizzled veteran chanced to mention the match biting mouse, his neighbor lifted up his voice, even as the farmer who first beheld the giraffe, and declared with emphasis, "There ain't no such animal."

Given a group of raging iconoclasts, devoid of reverence and afflicted with acute contagious "Missouryitis," and what chance has a sacred tradition? Like so many wolves, they tear away, or strive to tear away, all the bright garments with which years of unquestioning faith have clothed it. They strive to rend its flesh until at last nothing remains but a naked skeleton, and even then that skeleton must be haled before the judge.

Long and earnest was the debate. Then a hat was passed (no missionary meeting would be complete without passing a hat) and the proceeds invested in sundry catch-'em-alive traps, wire cages, *and cheese.*

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The cheese was for the purpose of luring sundry innocent and unsuspecting rodents into the aforesaid traps (a suggestion of trying matches was voted down promptly) and the purpose was accomplished.

Then, in defiance of the S. P. C. A., the lured ones were transferred to the cages and placed upon an exclusive diet of matches. Just what particular brands were used for the piece de resistance, the entree and the dessert does not appear, but it was an exclusive match diet.

The result might have been anticipated, for what rat or mouse, however much he might glory in the delicate flavor say, of a "taendstikker," as a substitute for an after-dinner mint, would so far forget the traditions of his race as to submit to feeding entirely upon matches under compulsion? Perish the thought! Even cannibalism would prove a welcome alternative. *And so it proved.*

And a certain group of S. P. C. A. defying men are exclaiming "I told you so" and exulting that they have demolished one more superstition.*

No general belief, however, is obtained without some good foundation; and the frequency with which burnt matches appeared about partially consumed nests certainly gave color to the belief, which was strengthened by the use of phosphorus in poisoning rats.

Whether rats ate the paste because it tempted them more than the phosphorus repelled is not demonstrated; but eat the compound they did, and between the effects of it and their earnest endeavors to drink themselves to death (on water), their survival of the meal was short. Possibly the change in the composition of match heads has been the cause, but at present no one seems to be finding burnt matches in rat and mouse nests.

The fires, however, continue just the same—or if anything a little more so.

And why not? Given an agglomeration of bits of paper, rags of all sorts, and almost any light material, ranging from the size of an orange to the bulk of a fair sized melon (when several are joined), packed into ill ventilated spaces between floors or studding, or crowded against warm chimneys or steam pipes—there certainly ought to be trouble resulting.

Watch the rats and mice dart across factory floors, even with the machinery in operation, seizing and dragging away those nice oily bits of waste; note how suddenly and almost mysteriously the grease soaked paper in which your package of lard or butter was contained has disappeared; note the ragged edges of the mop used on your freshly oiled floor; try to find the oily rag you used on your furniture and forgot for the moment—and part of the mystery of these fires disappears.

Rancid lard† and butter are dangerous, and paper well saturated with them, and worked into a nest in contact with shredded rags, will saturate the rags also. The nests are in warm places (we build most of our houses to shelter rats and mice) and their bodies are warm. *There is no need to gnaw matches.*

If we fight the rat and the mouse we fight fire; if we would fight fire we must fight the mouse and the rat. Everywhere, for safety and sanitation, we must fight them.

We ought to build rat-proof and mouse-proof houses, but we have not reached that point yet. Rat-proofing costs money, probably less money by far, in the long run, than maintaining the pests; but it is ready money and not paid in installments "so small you do not feel them."

Be kind to cats (as far as you can). If you live in the country, and don't think the remedy worse than the disease, keep a pet bull snake. Invest in traps, plenty of them (the glass traps now on sale will deceive the wisest and wiliest rat). Use poison if you dare, but with much caution. But fight them always, at all times and in all places. Plug up their holes. Do anything to harry them.

*Experiments also made by Underwriters Laboratories.

†Dr. Von Schwartz rates rancid American hog fat as dangerous as linseed oil.

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We may bury the match tradition, if you will, but the nests will remain, and always the nest was the menace, however ignited.

To effectually fight fire we must fight the causes of fire. Slug the rat even as you would swat the fly, as the last is for health alone, the first for both health and safety.

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THE HAZARD OF THE MOVIE.

No. 81 —In popularity, the "movie," as a form of amusement, easily takes first place. In an hour a person may see a five-reel or six-reel production of a novel, that would take that same person, under ordinary circumstances, two or three weeks to read. There are thousands of people, the country over, who have the "movie" habit. But of the many thousands affecting this form of recreation, very few stop to consider the hazard in connection with it.

Briefly speaking, this hazard may be summed up in one word, PANIC, but panic from fire is the most to be dreaded.

Owing to wise regulation, the projecting machine (the point at which the real and material hazard is present) is isolated in a fireproof booth. The matter of fire appliances, the care to be exercised in the use of films and the general conduct of the business are also regulated. In addition, certain requirements are exacted as regard structural conditions. Every contingency is provided for by regulation, but regulation without frequent supervision fails in its purpose.

Take the matter of fire appliances (buckets, extinguishers, hooks, axes, etc.) as regard location, accessibility, and readiness for immediate use. The regulations provide for all of these things, yet inspection discloses that water in pails has evaporated or has been used for other than fire purposes, or that they have been so placed as to be inaccessible. When fire pails, extinguishers, etc., are wanted they are needed in a hurry, and a fire appliance located where it cannot be reached, or that is not in condition for *immediate* use, is as good as none at all.

Curtains used to shut off drafts, screen passageways, toilets, etc., and draperies used to secure decorative effects, are another matter to which little attention is paid. The authorities will require that a "movie" be constructed fireproof, or as nearly so as possible, and then this purpose, of eliminating the fire hazard, is defeated, at least in part, by the placing of inflammable curtains and draperies within the auditorium. All curtains and draperies should be fireproofed or removed altogether.

The matter of lights in alleys, courts, and passageways outside exit doors is another thing that is often slighted. The exit lights on the auditorium side of the doors are taken care of, as they are in plain sight, and any failure to light them would be quickly noticed. But the outside lights being on a separate circuit, are often forgotten. Yet in case of emergency the outside lights are as important and necessary as the others.

Exit doors of the double swing type are often reduced to half their capacity by the slipping of the flush bolts at top and bottom. This is done for the purpose of controlling crowds entering. This is very bad practice and any door that is found necessary to lock from the outside should be equipped with panic bolts on the inside.

Booths are constructed according to specifications prescribed by law; but again their purpose is defeated, when the springs of the doors are removed, or the doors held open by some article placed against them, or by being tied back with cord. Operators do all these things for the purpose of securing more ventilation. If necessary that the door of a booth be open, it should be connected with the "master" cord controlling the shutters of booth.

Openings in booths for projectional or any other purpose, should have shutters with a "master" cord attached thereto, said cord to be equipped with fusible link where it passes over the projecting machine. In event of a blaze occurring in the booth it would automatically cause the shutters to close and confine the fire to the

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booth. If booth is supplied with sand and a gas extinguisher, it is ended as far as the audience and the building are concerned.

If rewinding is done in booth, it should not be done while machine is running. It is better to have a separate rewinding room, which should be constructed fireproof. Every reel, after being rewound, should be placed in a metal case, and then placed in a magazine. The practice of leaving reels on rewinding spools, or of having two or three lying around the rewinding room or booth, with cover off the cases, or perhaps not placed in cases at all, is one to be discouraged. A metal receptacle with self-closing cover, containing water, should be provided for film clippings, if any extensive repairing or patching is done, and this should be emptied daily.

All wiring should be done in accordance with the provisions of the Electrical Code, and the installation of temporary or decorative lighting effects should not be permitted unless said provisions are complied with.

In direct current machines the rheostats should not be placed on floor, but on an asbestos or stone shelf five feet above floor of booth. Better still, remove them altogether, for then all danger of accidental contact with loose ends of reels, and a "flare-up" is avoided.

In mentioning the above hazards in connection with the motion picture theater, structural conditions have not been taken into consideration, criticism being confined to what may be classified as recurring conditions or faults of housekeeping.

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No. 82 WOODEN SHINGLE ROOF AS A CONFLAGRATION HAZARD—It is fairly well understood by all those that have to do with the extinguishment or prevention of fire, that the real conflagration menace of today lies with the wooden shingle roof covering. In most cities throughout our country it leads all other causes as the originating point of fires, and is certainly a standing invitation for conflagrations.

The starting of a fire on a wooden shingle roof is brought about, usually, by fire brands or live sparks, carried by draft from chimney or stack, dropping on the roof, the age of the shingles very often determining whether or not ignition will take place.

Conditions for conflagrations are at their worst on a hot, dry day, and with a high wind velocity. Blazing shingles, or other fire brands from a burning building, ascend with the hot air currents, and drop on other wooden shingle roofs at other distant points, thereby starting fresh fires; these fires in time, repeating the performance until, in a short time, the fire has extended far beyond the control of the fire department on the grounds.

The great surprise of it all is that we do not have more conflagrations throughout our numerous wooden shingle roof districts. It is incomprehensible how the people will persist in using the wooden shingle, when there are noncombustible and slow burning roof coverings at slight additional cost, equally as artistic, and exceeding the wooden shingle in durability. I believe that a concerted movement by various fire protective associations, both National and State, State fire marshal departments, and municipal fire departments, toward the adoption by municipalities throughout the country, of ordinances prohibiting the placing of wooden shingles on new construction or replacement on old buildings within the city limits, would have a beneficial effect. We have made great progress with our "sane Fourth," why not a sane roof covering? I realize that a move of this kind would bring out considerable opposition from the trade affected, but nevertheless, a beginning should be made, and a continual hammering kept up until the last wooden shingle has disappeared from all built up districts throughout this glorious country of ours.

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Prizes for October Articles

First Prize. No. 77. Jacob Winkler, Inspector, Bureau of Fire Prevention of City of New York, Long Island City, N. Y.

Second Prize. No. 75. P. L. Davis, Special Agent, Hartford Fire Insurance Company, Vicksburg, Miss.

Honorable Mention. A tie. Nos. 76 and 78. William Jordan, Jr., Brooklyn, N. Y., and Orren H. Judd, Safety Inspector, American Steel Foundries, East St. Louis, Ill.

Comments by Members of the Committee

I vote for No. 77. Unqualifiedly the best article that has appeared in some time. I like the "snappy" way in which the writer has treated the subject. No theories, just hard plain facts and every paragraph of value to anyone interested in the subject. The subject is thoroughly covered with one exception and that is in the paragraph where the author speaks of "thermostats in conjunction with sprinklers" where, in my opinion, some mention should be made of the fact that thermostats to be of value in this case should be "set" at a lower temperature than the sprinkler heads.

No. 78 is timely and complete, showing both peril and remedy and evincing thorough knowledge and careful thought. The author certainly deserves a compliment. It ought to be read by every employe of railroads using oil burners. No. 75 deserves special mention, and in fact the others are good prize winning material under other conditions.

I cast my vote for No. 76. The idea of encouraging the construction of buildings of incombustible material outside of the fire limit district, in the manner suggested in the article, is practicable and the benefit to be derived is unquestionable. This article strikes me as being original, for which it is to be commended.

I cast my vote for No. 77. He has the best article in this issue. Safety eclipses danger in all buildings such as the author mentions, when the automatic fire alarm system is employed in conjunction with the sprinkler system.

I cast my vote for No. 77 for the reason that the writer has selected a subject that I believe to be of great importance, and one that would indicate the writer's somewhat complete knowledge on the subject. It is generally recognized that the one weak point in the chain of events of a fire and its extinguishment is the time lost between the start of a fire and the transmitting of an alarm. Very often this delay is fatal. The closed circuit type of automatic fire alarms for buildings would overcome this valuable loss of time to a wonderful extent; and in many instances it would be the means of confining the fire to a small area.

My choice for first prize is No. 77, as an automatic alarm system in buildings is one of the greatest devices for saving life and property. It neither slumbers nor sleeps, and is reliable as a rule.

The reason that I believe that No. 75 is the best article is because it deals with cold facts, which are known to everyone who has made a study of fire prevention. If more attention were given to the home hazard the fire waste from this source would be reduced.

I vote for No. 75 because it singles out what may be considered the two most prolific sources of fire hazard. It is, of course, difficult to control incendiarism, but no such difficulty exists in the matter of wooden shingles. It is disgusting to realize that parsimony and self-interest have thus far defeated all efforts which have been made to secure the prohibition of wooden shingles.

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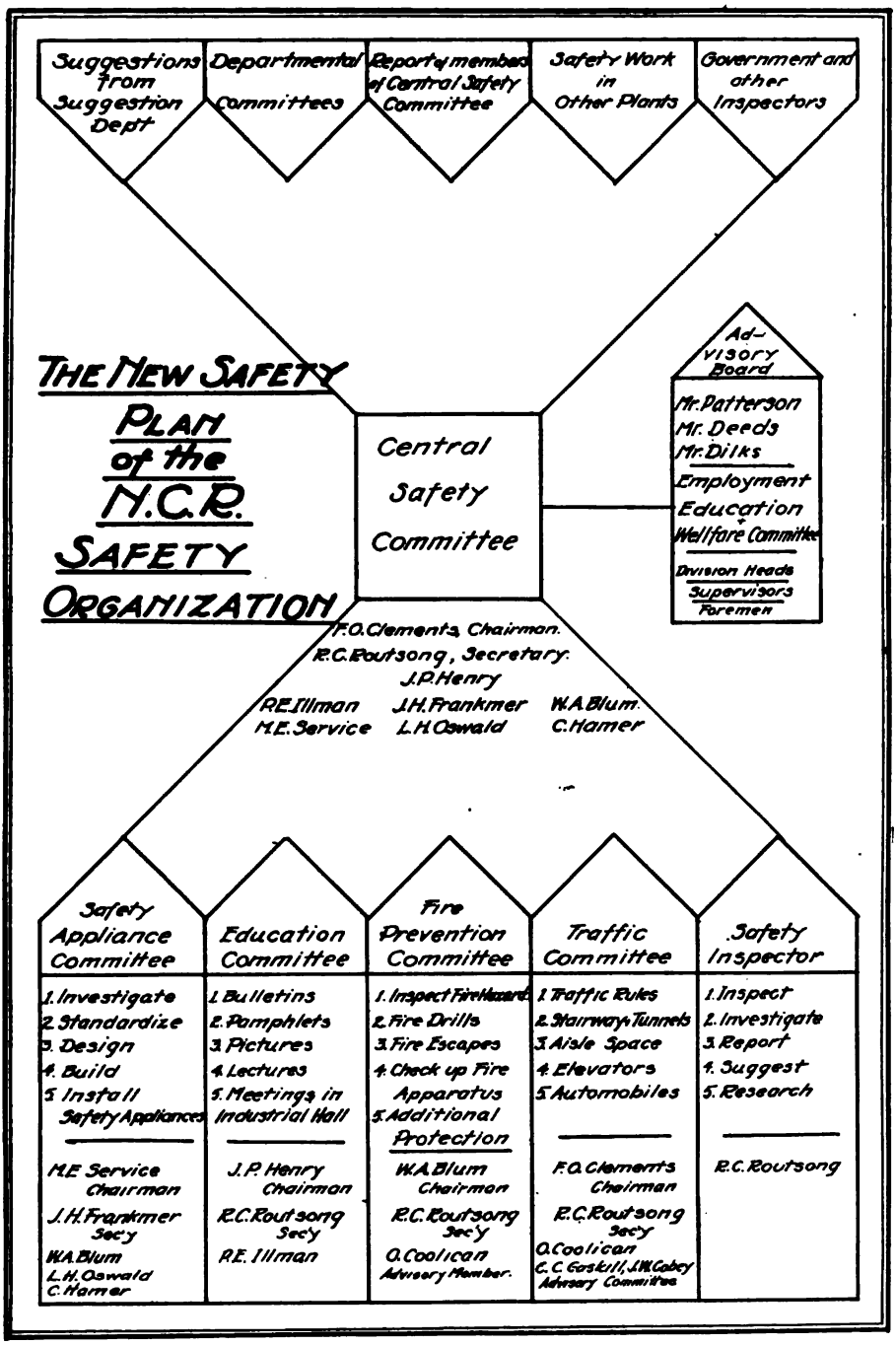
Organization for Safety



The National Cash Register Company's plan provides for a central safety committee of nine members. Departmental safety committees are appointed each month by the central committee. Committee members meet not as machine hands, job foremen and foreman, but as committee members—all on an equality.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

BOILER SAFETY

The Foster Engineering Company, Newark, New Jersey, manufactures the Foster Automatic Non-Return Stop Valve which secures conditions of safety on boilers. It is designed as a boiler-equalizing and safety valve and when installed between the boiler and header, it equalizes the pressure between the units of a battery of boilers, remaining closed so long as the pressure is lower than that of the header. It automatically prevents the back-flow of steam into a disabled boiler, and can also be used as a check on the boiler fireman, to determine when a boiler pressure drops too much while cleaning fires, etc. It acts as a safety stop valve to prevent steam being turned into a cold boiler while men are working inside—the pressure in header making it impossible to open the valve. It maintains as nearly as practicable a uniform working pressure on each boiler.

This concern also manufactures the Foster Automatic Non-Return Emergency Stop Valve.

This valve automatically closes in case of accident to boilers, cutting any disabled boiler out of a battery and prevents flow of steam on the other boilers into the disabled one. In the event of rupture in main line or break in fittings causing sudden escape of steam, it will close automatically and prevent further flow of steam from boiler or boilers.

PROTECTING RECKLESS HUMANITY

One of the large commercial office buildings of New York City recently had an elevator accident with fatal results. It was not an outsider this time nor even a tenant who was killed, but the Chief Engineer of the building itself.

The circumstance emphasizes again the wisdom and pertinence of such ordinances and regulations as prohibit the use of elevators where the hatchway opening gate or door is not strictly co-operative with the car, or can be opened at all from the landing side.

The hatchway doors in this building could be unlocked from without and the Chief Engineer carried a key. Miscalculating on the location of the car when he unlocked a hatchway door, he fell sixty feet through the hatch to his death.

It is a matter of Coroner's record that there is an average of eighty elevator fatalities each year in the Borough of Manhattan, which is only one of the five boroughs of Greater New York. Eighty per cent. of these killings occur at the elevator hatchway openings. Nobody knows what the yearly record would be of the people who are merely hurt or seriously injured throughout the entire United States. The killings are known to the number of several hundreds.

In this connection the award of the Scientific American gold medal, early this year, by the American Museum of Safety to the Shur-Loc Elevator Safety Company, Inc., is particularly significant as showing the timeliness of this invention for safeguarding human life by making elevator doors safe. This medal has now been awarded six times; to the Rich Marine Fire Extinguisher Company, 1908; to the Patent Scaffolding Company, 1909; to the Norton Company, 1910; for the Pulmotor, 1912; to the Welin Marine Equipment Company, 1913; and to the Shur-Loc Elevator Safety Company, Inc., 1914.

The Shur-Loc invention involves in the most simple and direct way the application of what safety calls the "interlocking principle," making it impossible to open the hatchway door either from within or without, until the car is at a safe landing, or to start the car until the gate is again locked.

To use the words of Dr. Frederick R. Hutton, Vice-President and Chairman of the

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Bureau of Awards and Professor Emeritus of Columbia College, the award was made to Shur-Loc, "for its attainment of mechanical safety, and the prevention of obstinate and reckless humanity from doing that which it ought not to do."

A $500 SAFETY GUARANTEE

The Powerlight Manufacturing Company has just made an announcement that will interest all safety men. Each "Powerlight" lamp is now sold by this firm with a guarantee not to explode. The Powerlight Manufacturing Company agrees to pay $500 within five years to cover damage to household goods by explosion of its lamp. The company agrees, also, to replace free of charge any defective parts, returned within five years following date of purchase, mantle, generator and glassware not included.

The Safety feature that distinguishes the "Powerlight" from other lamps is that it can be upset, even when lighted, without spilling the oil or breaking the mantles. The light will go out if accidentally dropped. This lamp can be rolled about on the floor—this is being done by the company's salesmen every day—with no danger of explosion.

The "Powerlight" attracted much attention last year at the International Exposition of Safety and Sanitation. After a thorough test by the judges, the "Powerlight" received the highest award at this exposition. This lamp was the only one which received an award.

The "Powerlight" burns 95 to 97 per cent air and 5 or 3 per cent fuel oil. The light is of such a character that one can read, write or sew without injury to the eyes. The design of the lamp is neat and symmetrical. The lamp is made of excellent material—highly nickel plated.

The Powerlight Manufacturing Company, 543 Broadway, Department A, New York City, will gladly give further information or send its catalog to any one upon request.

GYPSUM AS A FIREPROOF MATERIAL

Gypsum as a building material has been used from very remote times. Ancient writings mention the use of this material by the Egyptians, Greeks, Syrians and Moors. Gypsum is found in almost every country in the world. Large deposits exist in the United States. It is a soft mineral, ranking number two in a scale of ten in Moh's scale of hardness. It is slightly soluble in water.

In modern fireproof construction gypsum is now coming largely into use. Among the features which make gypsum plaster desirable as a fireproof material, may be mentioned: Low conductivity of heat, low coefficient of expansion (practically zero), resistance to water, incombustibility, lightness, strength, adaptability or plasticity, low cost.

The technical uses of plaster are manifold. Wherever insulation against heat or cold is desired, there plaster may be found. For the purpose of fireproofing, plaster is used in a number of ways, the most common being on metal lath, plaster blocks, plaster boards, plaster studding and plaster poured on molds. Gypsum plaster on metal lath forms a strong substantial fireproofing, the metal fabric being used as a base for the plaster and as a strengthening mesh.

Plaster block or gypsum tile is largely used in fireproof construction. The blocks are made of pure gypsum and wood fiber in convenient sizes and possess soundproof qualities as well as lightness of weight.

Considering all the good features of gypsum products from a fire-retardant standpoint, its low cost and the extent to which the material is found, it is evident that gypsum will play a great part in fireproof construction. An interesting booklet by H. G. Perring, A. S. C. E., describing gypsum as a fireproof building material, will be sent on request by the United States Gypsum Company, 205 West Monroe street, Chicago.

WINDOW WISDOM

S. H. Pomeroy Company, Inc., 282 East 134th street, New York City, is issuing a series of folders entitled, "Window Wisdom." This concern is well known as a manufacturer of high quality fire retardant windows. There is much information contained in these folders, helpful to those seeking the best protection against fire from fire retardant windows. Copies will gladly be sent by the above mentioned manufacturers.

FIRE-RESISTING QUALITIES OF THE SAFE-CABINET

The Safe-Cabinet Company, Marietta, Ohio, has maintained a scientific testing laboratory in which its experts, working alone or in co-operation with representatives of the fire insurance and fire protection interests, have conducted numerous tests of its products and those of other manufacturers.

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On the 15th of January, 1915, in the presence of a large gathering of men, interested in the subject of fire prevention, the latest model, the "S-Cientest," of the Safe-Cabinet was put to very severe test to demonstrate its fire-resisting efficiency.

This Safe-Cabinet was partially filled with records, papers, books and memoranda, including a large amount of currency. It was then placed in the furnace where heat-recording instruments of the most approved type were inserted in it. A series of large gas burners was then placed through the floor of the furnace in such a manner as to completely surround the Safe-Cabinet on all four sides. The furnace was closed. The cabinet remained in the furnace for 45 minutes. The highest temperature recorded was 1,820 degrees Fahrenheit. The gas was then turned off and the cabinet was immediately removed on an elevator, red hot, and was hurled 30 feet from a tower to the ground floor. Not a seam came open. A ton of bricks from the tower was then dropped on the Cabinet doors, denting the steel walls, which were still softened by the intensity of the heat.

When the doors of this Safe-Cabinet were opened the papers, currency and records it contained were found to be undamaged. Thus, the Safe-Cabinet conclusively demonstrated that it can withstand successfully very severe heat tests and rough handling.

BOEDTCHER'S SAFETY DOOR SWITCHES

The Boedtcher Dorloc Safety Device is designed so that an elevator cannot move unless all doors are locked. This tends to prevent accidents which have occurred in the past, where people have opened a door leading to an elevator shaft which has been closed but not locked. Most operators will start their car at the same time they begin to close their door, and very often the top of the car is below the landing floor before the door is closed. The operator, therefore, is not able to see whether the door is actually locked. In the Boedtcher System, these dangers are eliminated, inasmuch as the operator cannot start his car until all shaft doors are actually locked.

In addition to safety door switches, Franz A. Boedtcher of 413 West 41st street, New York City, manufactures a line of Automatic Reset Annunciators, Button Reset Annunciators, Elevator Signal Systems and Mechanical Dial Indicators.

CORCORAN TANKS

Since 1865 Corcoran Tanks have been recognized as products of good workmanship and the makers have always had a reputation for fair dealing. From its conception, the firm adopted a policy of fair prices and efficient workmanship.

The chief point of merit in Corcoran Tanks is their waterproof character. The tanks are built right from the beginning so that there are no heavy extras for repairs.

The modern Corcoran factory in Jersey City is equipped for producing the largest tanks. Here the outward and downward pressure is carefully computed, so that no weak point is overlooked.

A Corcoran specialty is Frostproof Tanks. Particular attention is given protecting the pipes, which in addition to having the regulation covering, are boxed.

POWER'S AT ELECTRICAL EXPOSITION

For the purpose of graphically depicting the various phases of the electrical industry, four Power's Cameragraph No. 6B, motion picture projecting machines, were utilized with the usual excellent results at the Electrical Exposition held at the Grand Central Palace, New York City, during the week of October 5, 1915.

DAVY SAFETY GAS HEATER

The Davy Safety Gas Heater meets a need which has long existed for safely heating Garages, Moving Picture Theatres, Play-Rooms, Work-Rooms and other places where other forms of heating would constitute a hazard.

It is especially adaptable for heating Garages, and for this purpose the Davy Safety Heater meets the demand in a satisfactory manner. This Heater has been examined by Leading Gas Companies and Municipal Fire Prevention Bureaus.

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EXPLOSION INSURANCE

American manufacturers who are engaged in the production of munitions of war for the European belligerents, are confronted with a new hazard in their plants—that of explosion. Many attempts have been made by sympathizers to wreck by explosion, factories where war supplies are being made. In order to safeguard manufacturers against serious losses in the event of damage to the plant from this cause, the Hartford Fire Insurance Company is now issuing an explosion policy against loss caused by the explosion of bombs or of infernal machines, and also from any explosion cause, except bursting boilers and flywheels.

This policy does not cover loss by fire in any event. There are two forms, one covering direct loss from explosion, the other covering use and occupancy losses caused by explosion. This policy will not be written, however, to insure plants making munitions of war that are of an explosive nature, such as powder mills and shell-loading factories.

AN EFFICIENT FIRE ALARM SYSTEM

The efficiency of the Aero Automatic Fire Alarm System is shown in the following communication received from a concern which is using this protection against fire:

> "We recently had a small fire in our warehouse building which is equipped with the Aero Fire Alarm System, and the effectiveness of this system enabled our night crew to locate the fire immediately, preventing what otherwise might have been a serious fire. On account of the highly satisfactory results obtained from the system in this case, we have decided to extend it to other parts of our plant, which is being done at the present time."

Every fire preventionist knows the importance of locating fire as soon as possible. The great majority of all fires are small at first, and if they can be located in that stage, are extinguished with little damage. Locating the fire as soon as possible is real fire prevention.

FIRE PREVENTION AND FIRE DRILLS

Mrs. B. S. Coburn, Chairman Woman's Auxiliary Committee, Mississippi Society for Prevention of Fires, has prepared a 60-page book on the subject of fire prevention and fire drills for use in the schools of the State of Mississippi. The common fire hazards are presented in an interesting manned and the book contains many practical fire prevention suggestions. It should prove helpful where the subject of fire prevention is being presented to the younger generation.

VEST POCKET FIRST AID

The National First Aid Publishing Company has published the third edition of Vest Pocket First Aid. This little book, comprising 104 pages with 66 illustrations, was prepared by Dr. D. E. Sable for the purpose of furnishing the necessary information for first aid work in a manner readily understandable by all. It is devoid of confusing medical terms and is written in simple language. The manufacturer and worker alike who desire to secure an understanding of the rudiments of first aid work will find the Vest Pocket First Aid a helpful means of information. The size is convenient for carrying in the pocket, and it is printed in English, German, Italian and Slavish.

STEEL SHAFT HANGERS

The Standard Pressed Steel Company, Philadelphia, manufactures Steel Shaft Hangers which they claim, are unbreakable. While cast iron shaft hangers do not break frequently, accidents do occur from the cast iron breaking. Shaft hangers which support the line shaft with its couplings, pulleys and belts, invariably are suspended from the ceiling, and in case of breakage, therefore, it's a matter of a great weight of iron and steel suddenly shooting down upon unprotected employes. The use of Steel Shaft Hangers in place of cast iron will readily appeal to industrial safety officials.

A SAFE LIGHTING PLANT

The Oxweld Acetylene Company, Chicago, the well known manufacturer of the Pilot Lighting Plant, has devoted a great amount of labor and expense to producing the Pilot Lighting Plant. Not alone has it striven to incorporate in its apparatus a high degree of efficiency, but the factor of safety has been of first importance in the design and construction of the Pilot Plant. The fact that the Underwriters' Laboratories, Inc., Chicago, have approved this machine, is conclusive evidence that it meets the most stringent safety requirements. Some 200,000 families living in country homes in the United States are using this lighting plant and find that it meets in a satisfactory manner all the requirements of a first-class safe lighting plant.

Acetylene, when burning, makes a soft white light. It has none of the odor, heat or bad affect on the eyes and health that kerosene or gasoline has. Acetylene is made from calcium carbide. It is not affected by heat, actual fire or temperature of any sort, but when brought in contact with water it instantly generates gas. A receptacle in the generator is filled with the carbide and whenever the lights are burned, a little at a time is dropped into the water automatically so that the gas is formed just as it is used. The machine needs filling only at intervals.

The Pilot Lighting Plant is made of sheet steel and other substantial materials. Insurance companies permit the installation of Pilot Generators in insured buildings without increasing the premium, which is a strong endorsement as to its safety. Booklets describing the Pilot Lighting Plant will gladly be sent by the manufacturer.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

ASBESTOS CENTURY SHINGLE ROOF COVERINGS. Laid American Method. Keasbey & Mattison Co. Thatched type, smooth surfaced. Two thicknesses. Attached by nailing. Limited to combustible and non-combustible roof decks capable of receiving and retaining nails and to inclines exceeding 4 ins. to ft. horizontal. These roof coverings are shown by tests and investigations at Underwriters' Laboratories to afford a high degree of heat insulation to roof decks; to be not flammable; not to carry fire; to slip from position to a moderate extent only; to exert a slight blanketing influence upon fires within buildings; to be durable under ordinary service conditions for periods in excess of 7 years, and to fulfill requirements of classification given.

BARRETT SPECIFICATION ROOF COVERINGS WITH GRAVEL OR CRUSHED SLAG. Barrett Mfg. Co. Built-up type, non-combustible surfaced. Five plies. Flashings and trimmings of 16-oz. copper or heavier. Assembled in accordance with Barrett Specifications. Attached by nailing. Limited to non-combustible roof decks and inclines not exceeding 1 in. to foot horizontal. These roof coverings are shown by tests and investigations at Underwriters' Laboratories to afford a high degree of fire protection to roof decks; to be not readily flammable; not to carry or communicate fire to any material extent; not to slip from place when heated; to possess little or no flying brand hazard; to exert considerable blanketing influence upon fires within buildings, and to be durable under service conditions for periods in excess of 10 years and to fulfill requirements of classification given.

CABINETS. Mutual Electric & Machine Co. Cabinets shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters and examined at factories and passed by Underwriters' Laboratories.

HOSE, RUBBER-LINED. C. C. C. Fire Hose & Rubber Co. Cotton-Rubber-lined Hose, either single, double or triple jacketed and Rubber Hose, all sizes, for Fire Department use.

CONCENTRIC FILL AND VENT FITTING. Chicago Steel Tank Co. Fill and vent fittings of concentric type to be used in connection with underground storage tanks and designed to safeguard hazards of filling tanks with hazardous liquids such as gasoline, naphtha, etc.

DOORS AND SHUTTERS, METAL. Saino Fire Door and Shutter Co. Door made of two thicknesses of corrugated steel. Corrugations of faces next to wall horizontal and at outer face vertical. Asbestos used between faces. Faces fastened together at edges. Door stiffened by bars in vertical edges. Doors for openings wider than 72 ins. are further stiffened by horizontal channels formed in sheets on face next to wall.

DOORS AND SHUTTERS, METAL-CLAD. The John E. Mannen Co. Tin-clad fire doors and shutters, constructed in accordance with requirements of the National Board of Fire Underwriters. Designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. Deets & Co. Tin-clad fire doors and shutters, constructed in accordance with the requirements of the National Board of Fire Underwriters. Designed for the protection of openings in walls and partitions.

DOOR FRAMES, METAL. Dahlstrom Metallic Door Co. Frames for Single Swinging Doors Mounted Singly or in Pairs. Frames consist of head and jambs, formed of sheet metal channels of identical cross section.

FUSIBLE LINK. Richards-Wilcox Mfg. Co. Fusible link for use in connection with automatic closing devices for doors, windows and other automatic devices requiring fusible links.

INSIDE HAND-OPERATED DISCHARGE DEVICE. George Stiefel Co. Vertical, single-acting pump, designed for use with Inside Discharge Systems for handling hazardous liquids. Cylinder capacity: Less than 1 gal.

MANUAL FIRE ALARM. Fire Alarm Signal Co. Manual and local fire alarm box and circuit relays.

MOULDING. Connecticut Electric Mfg. Co. C. E. M. metal moulding.

PICTURE MACHINES AND APPLIANCES. Automatic Film Winder and Rewinder Co. The Horting Rewinder. A cast aluminum magazine mounted on a metal base, and designed to inclose reels of films during rewinding process. An electric motor drives, by belt, one of reel spindles, and an automatic switch opens motor circuit when rewinding is completed.

PICTURE MACHINES AND APPLIANCES. Motion Picture Fire Prevention Devices Co. "Film Circuit Closer." This device consists of a cam operated switch, for use on motor operated picture machines, so designed that in case of a broken film or release of tension on take-up reel, motor circuit is opened.

SIGNAL APPLIANCES. Schwarze Electric Co. Schwarze electric bells for alarm and signaling systems.

SOLID SECTION METAL FIRE WINDOW FRAMES. Winslow Bros. Co. Solid section metal fire window frames and sash for wired glass made in following patterns: Pivoted upper and lower.

VALVES, FOR HAZARDOUS LIQUIDS. U. S. Novelty Mfg. Co. Quick-closing, brass anti-drip faucet, and hose or two-way valve, designed to obviate necessity for repacking joint around valve stem, and suitable for use on Inside Discharge Systems,. Dry-Cleaning Systems, etc. Each of these valves is furnished in ¾, 1 and 1¼ in. standard pipe and hose sizes.

UNDERGROUND STORAGE TANKS. Macomb Sheet Metal Works. Cylindrical steel tanks with riveted and soldered joints, designed for storage of hazardous liquids in connection with Isolated Storage Systems, Inside Discharge Systems, Gasoline Engines, etc.

WATCH SERVICE, CENTRAL STATION. Holtzer-Cabot Electric Co. Type F Combination Watch and Fire Alarm Box.

SAFETY ENGINEERING WEEKLY FIRE REPORTS

$5.00 PER YEAR

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SAFETY ENGINEERING

Vol. 30 DECEMBER, 1915. No. 6

Current Comment and News

A FEATURE of progress in the safety movement during 1915 is the increasing number of safety exhibits in various parts of the country. This is a healthful sign, a development that should receive the hearty support of all who are interested in the progress of safety. The demand for exhibits of this kind indicates a desire on the part of the public for practical knowledge regarding the methods and the mechanical applicances for the prevention of accidents. One of the more recent of the local safety exhibits was held in the public library at New Haven, Conn. Apparently public libraries, especially libraries in industrial cities, are desirous of conducting safety exhibits. SAFETY ENGINEERING is asked to encourage safety organizations to send exhibits to libraries throughout the country, the library to pay expressage one way. That is an excellent idea—one that is likely to be developed considerably in 1916.

The National Safety Council is fortunate in the selections of chairmen for the new sections, created at the Fourth Annual Safety Congress. Portraits of several of the chairmen, in this number of SAFETY ENGINEERING, show them to be keen and able men. The pictures of other chairmen will be published as photographs become available.

Marcus A. Dow, chairman of the Railroad Section, is general safety agent of the New York Central Lines. For more than ten years Mr. Dow was engaged in the investigation of railroad personal injury cases and in connection with that work had excellent opportunities to study accident prevention. He was placed in charge of the safety department of all New York Central Lines, with offices in New York, on March 15, 1913. Under his management that department has become one of the most progressive organizations of its kind in America. The Safety Exhibit Car, inaugurated under his supervision, has attracted widespread attention. The policy of requiring employes to receive safety instruction during working hours is the outgrowth of his endeavors. Mr. Dow is president of the New York Local Council of the National Safety Council. The attendance at the first meeting of the Railroad Section was large, 37 steam railroads having been represented. The proceedings lasted a day and a half. Approximately 100 railroad safety men attended the sessions.

James M. Woltz, chairman of the Iron and Steel Section, has been safety director for the Youngstown Sheet & Tube Company since July 1, 1913. For thirteen years prior to that time he was in the employ of the United States Government as a postal inspector. He was a student of medicine at the Ohio Medical College, Cincinnati, in the class of 1900. Since the organization of the Mahoning and Shenango Valley Local Council, Mr. Woltz has served as secretary. He is a member of the General Advisory Committee, appointed by the Ohio Industrial Commission to formulate sanitary and safety standards, and is a member of a subcommittee of four designated by the commission to meet with the Industrial Commissioners, or a committee appointed by them, from New York, Massachusetts, New Jersey, Pennsylvania, and Wisconsin, in an endeavor to adopt uniform standards for sanitation and safety in these States.

The vice-chairman of the Iron and Steel Section, Earl B. Morgan, safety engineer of the Commonwealth Steel Company, is popular and prominent

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MARCUS A. DOW
Chairman, Railroad Section, National Safety Council

among the safety engineers of the United States. Mr. Morgan is regarded as an authority on the safety questions connected with the iron and steel business. His address at the Fourth Annual Safety Congress on "Safety in Crane Chain Practice" has been widely read and generally applied in the industries to which the subject relates.

George Oliver Smith, chairman of the Electric Railway Section, is supervisor of safety for the Doherty Operating Company, New York. Mr. Smith has done much original work in accident prevention as related to the operation of electric railways. His selection as chairman of the Electric Railway Section is due to his prominence and his success in this field of accident prevention. The portrait of Mr. Smith in this number of SAFETY ENGINEERING is taken from a snapshot while he was seated at his desk.

S. F. Shattuck, chairman of the Paper Manufacturers Section, is treasurer of the Kimberly-Clark Company, Neenah, Wis. Mr. Shattuck has been in charge of the safety organization of the Kimberly-Clark Company since its formation two and one-half years ago.

J. R. de la Torre Bueno, chairman of the Chemical Section, is secretary of the Central Service Committee of the General Chemical Company. He has specialized mainly in standardizing practice and on the subjects of first aid and medical care of employes and on the educational side of accident prevention.

E. G. Trimble, manager of the Employers Indemnity Exchange, Kansas City, is chairman of the Laundry Section. Mr. Trimble has been prominently connected with the National Safety Council for several years. Associated with him in the Employers Indemnity

GEORGE OLIVER SMITH
Chairman, Electric Railway Section, National Safety Council

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JAMES M. WOLTZ
Chairman, Iron and Steel Section, National Safety Council

Exchange, as the manager of safety work, is John Woodhead, known nationally as an authority on the hazards of laundry work. Undoubtedly the Laundry Section will have the benefit of his experience. During recent months Mr. Woodhead has delivered lectures on laundry hazards in 15 States.

The State Insurance Department of North Carolina is doing commendable publicity work in issuing at frequent intervals a "Fire Prevention and Fire Waste Page" for the use of daily newspapers. It is edited and prepared by Insurance Commissioner James R. Young. Especially timely are warnings concerning the use of inflammable Christmas decorations either in private homes or in shops, churches, etc.

State Commissioner of Education Kendall of New Jersey has issued a "Safety First" letter to the school boards of New Jersey in which he says: "The safeguarding of children in school buildings is of the greatest importance. Important as education is, it is not worth what it costs if this education involves physical danger to pupils and teachers in the buildings provided by the school districts of the State. The school law is explicit and mandatory—that every school district shall provide suitable school facilities and accommodations. Should there exist in your district a building containing possible fire or panic hazards you are not doing your duty until the possible danger to children from these hazards has been eliminated. You cannot afford to incur the criticism and censure of the public should an accident occur. Any building under your charge and for which you are directly responsible which does not have the proper fire and smoke

EARL B. MORGAN
Secretary, Iron and Steel Section, National Safety Council

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R. G. WILLIAMS
Chairman, Committee for Accident Prevention and Workmen's Compensation, National Association of Manufacturers.

safeguards for the quick and safe exit of the pupils should be closed until you have provided a safe building. A board of education does not hesitate to close a school on the appearance of a contagious disease among the pupils."

R. G. Williams, newly elected chairman of the Committee for Accident Prevention and Workmen's Compensation of the National Association of Manufacturers, is a member of the American Society of Mechanical Engineers, chairman of the Safety Committee of Grinding Wheel Manufacturers (which drafted the "Safety Code for Use and Care of Abrasive Wheels") and a member of the Standardization Committee of Grinding Wheel Manufacturers. Mr. Williams is associated with the Norton Company of Worcester, Mass., as sales engineer. Upon graduation from Columbia, where he received the degree of B. S. and A. M., he entered the employ of the Norton Company as a chemist in the analytical laboratory and was soon placed in charge of the Mechanical Division of the Department of Tests, later becoming assistant research engineer and safety engineer. Mr. Williams has delivered numerous lectures on accident prevention before safety societies, commercial organizations and technical trade schools. He is a native of Mt. Vernon, N. Y., where he obtained his earlier education.

It is of interest to record that on August 30 of this year William Guerin, chairman of the fire prevention committee of the Safety First Federation, made an inspection of Hopewell, Va. His report to the Hopewell Business Men's Association contained this paragraph: "In your city conditions are ideal for a conflagration which would destroy it in less than two hours unless Divine Providence interfered to save it, and as it is, a daily miracle is performed when the sun rises and finds your city intact." After the recent fire which practically destroyed the entire town, Mr. Guerin said: "The fate of Hopewell ought to be a lesson in fire prevention to the whole country. The inhabitants of Hopewell sealed the doom of their city when they disregarded the first principles of fire prevention. In my opinion Hopewell was the worst managed town in the United States." Mr. Guerin said he had advised the residents to equip their homes with fire extinguishers, but all to no effect.

Judge Joseph Sabath of Chicago is the presiding magistrate of the only court in the world which tries nothing but automobile cases. Last year he heard 20,000 cases of traffic violations. In speaking of his work, Judge Sabath said recently: "This year I think there will be many less. I have formed a 'Safety First Brigade.' In that brigade I invite the membership of all automobile drivers who are arraigned before me. If they desire to join I swear them to duty as my aids and ask them never to speed again. These men become a great help to me, for they write me about such violations as

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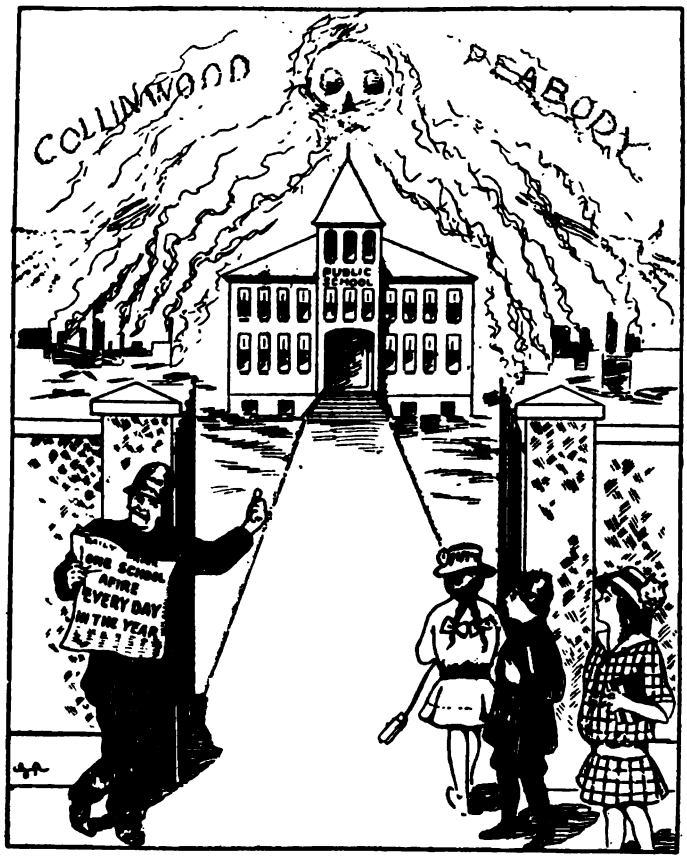
they see when there is no policeman to serve a summons. I find out who the owner of the car is and write him a personal letter asking him to call at my chambers. There I inquire about the alleged violation and invite him to become a member of the brigade. A chauffeur convicted by me of drunkenness has his license revoked. Third offenders are forbidden to drive again in the State of Illinois, for the Secretary of State gives me his absolute backing, and if I recommend the revoking of a license it is done."



New Bedford (Mass.) Standard.

A Good Place for "Safety First"

"Mothers start a majority of all sorts of fires — except those from dynamite and lightning and to defraud the insurance company," the fire marshal of Ohio says. "Mothers almost monopolize the gasoline fires, for they give that dangerous petroleum product a range of usefulness from cleaning hair ribbons to slaying bedbugs. Many use it as carelessly as if it were water and then empty it into the sink to be heard of later as a sewer gas explosion."

Installation of safety devices in manufacturing plants has usually been urged on the ground that they reduce the number of accidents to operatives, and no other particular advantage has been considered. Now it appears from the report of manufacturers of enameled ware that there are other incidental advantages of considerable importance, said the Hartford *Times*. The use of safety devices was adopted voluntarily by a number of men in that field, although it is true that their action was taken because of the agitation to have the change made compulsory, but it was taken up seriously and thoroughly under expert advice. The manufacturers were wise enough to understand the advantage of doing a thing well if you do it at all. They did not escape troubles. Some of the advice proved unpractical, and there was considerable hostility from the very workmen who were expected to benefit by the changes, their objection being based on fear that their earnings would be reduced through the precautions that were to be required. The manufacturers insisted, and the working scheme was developed something like a year ago. Now the results are being reported and they show a decided improvement in conditions and an actually increased production in place of the falling off that was anticipated. This is attributed in part to the removal of apprehension of injury.

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Fire Hazards of Untidy Cellars

Suggestion to Householders by the New York Fire Department

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Clothes Lockers for Employes

By Charles E. Worthington

Wellesley Hills, Mass.

IT is generally accepted that such dangers as proceed from unseen or invisible sources are more to be feared than those developing in places seen of all men.

This is particularly true in matters affecting the origin of fires, the concealment afforded by obscure corners or recesses and by closets being especially favorable to the development of combustion, spontaneous or other.

The small closets or lockers used by factory employes for their street clothes during working hours and to contain their overalls and other belongings at night, have a bad reputation as originators of fire, a reputation apparently having a substantial basis of fact, if one judges by the record.

Neither the necessity for these conveniences nor the need of adequate regulation of their construction and location can well be denied, and in a very large percentage of modern factories these necessities are recognized and a suitable locker room with lockers of expanded metal or similar material is provided, wherein the employes' belongings can be protected under ideal conditions as to situation and ventilation. There is, however, a considerable proportion of factories and other lines of business employing many hands where no provision whatever is made, as emanating from the management, and too frequently no control or supervision is exercised. In such establishments the employes are expected to construct such lockers for themselves from whatever material they can obtain most readily, without guidance or restriction either as regards form or location. The average workman, especially if foreign born, cannot reasonably be expected to have any appreciable knowledge of spontaneous combustion or of the conditions leading up to it or of the necessity for ventilation and, as a matter of course, he manages to procure a packing case of the proper size or else secures a few boards with which to make a box, which is nailed up in whatever situation seems most available, which is frequently exactly where it ought not to be placed. These little boxes are provided with improvised doors and locks and keys of varying patterns and are set up at random. Being composed of boards with

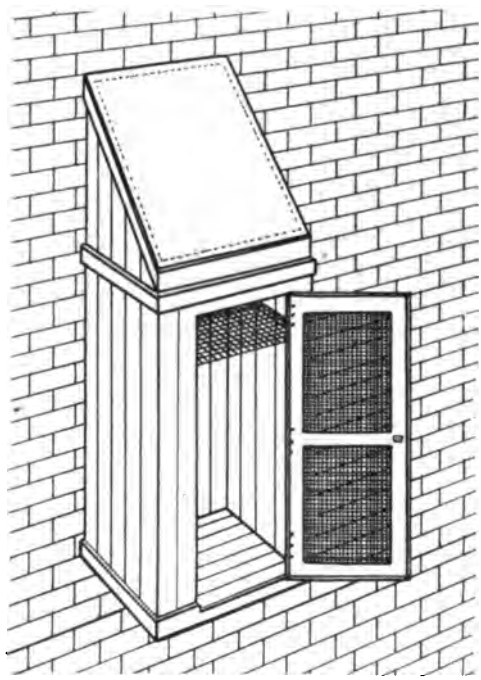

Fig. 1

wooden doors, and solid wooden tops, there is no ventilation, nor is there any opportunity for an inspector to view their contents in the absence of their owners, nor any knowledge of their actual contents by the management or its representatives.

Under such conditions, even a very small percentage of ignorance, untidiness or carelessness can hardly fail to be productive of bad result. Wherever properties are sprinklered, an attempt is made

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to modify these conditions by requiring the tops to be constructed of cloth, on the theory that a fire within will at once find vent upward and operate the nearest sprinkler and extinguish itself before the locker is thoroughly ignited structurally. This is remedy rather than prevention as it provides no better supervision and little betterment of ventilation, merely seeking to restrict the damage if ignition

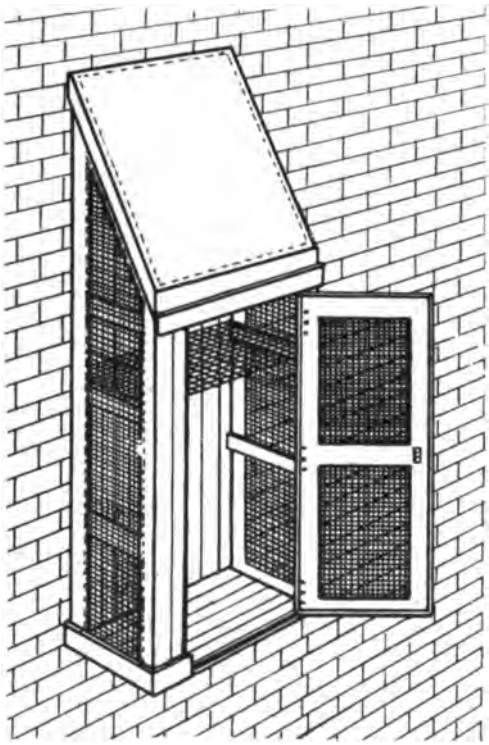

Fig. 2

occurs, and in practice it works out about thus:

Inspector X visits the premises of the Z Manufacturing Company, finding a number of clothes lockers of solid boards, sides, top and bottom. Possibly he notifies some representative of the management on the spot, or perhaps, he simply reports the fact to his own managers. The superintendent or foreman tells the employe that the insurance companies require the top of his locker to be changed to cloth, whereupon, without the least understanding of the reason why, he makes the change, occasionally using heavy oil-cloth or even tarboard; or he may cut out a small hole in the top and nail cloth over it.

This done, he at once proceeds to pile boards, clothes, tool boxes, papers or whatever he may wish to have out of his way, but close at hand, upon this convenient shelf, feeling that by changing to cloth he has done all that is required.

Then X comes again. He finds that new employes have built new lockers like the one criticised. He also finds the top of the first one obstructed as above mentioned, requiring more criticism and comment, involving, as every requirement not fully understood as to reasons does involve, more or less friction and annoyance. The unfortunate tendency of these conditions to reproduce would seem to require special treatment to avoid the irritation following repeated requests. Since the matter is really of some importance, some effort might well be made to impress upon the management and the employes the need of uniform regulation, taking form about as described below:

Official adoption of a standard form and size of locker not to be deviated from, which should in all cases be one permitting free ventilation and, where possible, inspection without opening, the contents being visible from without. The tops of such lockers should in all cases (unless of metal) be of light combustible material like cotton cloth (laid over a wire net support if necessary) and *slope at an angle of 45 degrees or more* so as to completely prevent using the top as a shelf to pile material of any sort upon. At least the doors should contain large panels of wire net, preferably, over four-fifths of their area, but it is better that the sides also be of wire net over a frame (wooden frame permissible). Where it is not practicable to locate lockers away from destructive dust, the wire panels in the door may be lined with cheese cloth, provided locks are of uniform pattern and capable of being opened for inspection by a "master key" in possession of the foreman or the superintendent (individual keys will not open other locks).

Notice of the standard form and regulations adopted should be posted in such a manner as to secure knowledge of them to every employe. Not only should strict

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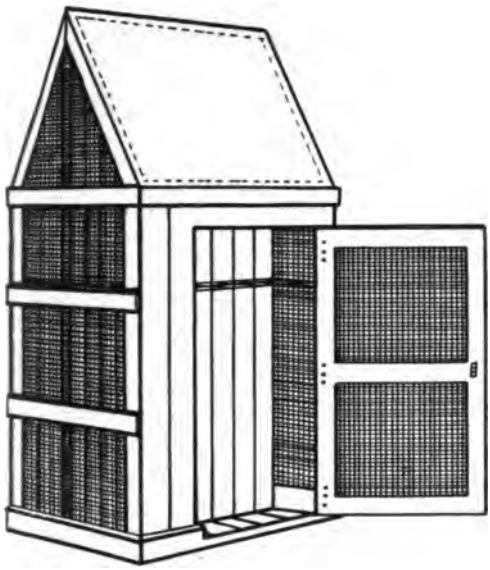

Fig. 3

adherence to the standard of construction be enforced but notice of intention to construct such a locker should be required to be given to the foreman or the superintendent, and his approval of the location obtained.

In places where there is a carpenter shop in connection, the management can co-operate by providing a small stock of material, wire, hardware, locks, etc., to be furnished at cost, thereby securing to the employe better material at less cost (since a good lock at wholesale costs less than a poorer one at retail) and also general uniformity. That is necessary where uniform locks and a "master key" are necessary.

Even where metal lockers are disapproved by the management for various reasons, lockers of wood and wire can be built in the shop and furnished to the employes without charge or, at the most, a minimum charge, the advantages of uniformity and safety being in every case sufficient to warrant co-operation (and generally contribution or complete assumption of expense).

Plans for such lockers are given herewith, not as exclusive plans but as suggestions, since any form that will insure security to the contents, easy inspection, good ventilation, combustible tops and tops upon which no obstructions can be placed or kept will serve the purpose.

Hat shelves and other shelves should be of heavy wire net, cloth covered if desired.

For wire net panels and general covering, the net usually used for skylights screens is serviceable. This is of galvanized wire, 14-gage or 16-gage, with mesh ½-inch x ½-inch, secured by ¾-inch staples. Where security is desired 1-inch slender staples can be used and clinched.

These suggestions are offered as a convenient and wholly practicable method for eliminating completely a troublesome and annoying condition and a rather serious fire hazard, but they are not intended to discourage in any manner the use of metal lockers, which are ideal. They are suggestions merely for situations and conditions where metal lockers cannot or will not be used, and as a method for securing comparative safety at an absolute minimum of expense; and, moreover, as a plea for co-operation between employes and employers to secure that end.

Chemical Industries

THE Chemical Section of the National Safety Council was organized on October 20. Ocers were elected as follows: J. R. de la Torre Bueno, General Chemical Company, chairman; Mr. Jordan, Semet-Solvay Company, vice-chairman; James V. Hodges, Semet-Solvay Company, secretary.

At a meeting of the section on October 21, the retiring president of the National Safety Council, R. W. Campbell, and Mr. Forster of the Independence Inspection Bureau, addressed the section. Ira V. Kepner was appointed chairman of the Committee on Standardization. Mr DeBloid, Du Pont Powder Company, was appointed chairman of the Committee on Program. Dr. Patterson was appointed chairman of the Committee on the Study of Causes and Remedies for Hazards in the Chemical Industries. Other committees are to be appointed and each committee brought up to its full membership. For the present the Chemical Section is busying itself securing an increased membership.

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Diamond Candy Company Fire

New York Board of Fire Underwriters Report on the Recent Factory Tragedy in Brooklyn

UNDERWRITERS' CONCLUSIONS: This fire demonstrated that it is fatal to store combustible stock in stair enclosures; that a building of light joisted construction will burn with such rapidity that the most reliable safeguard to life and property is a standard automatic sprinkler system; that ample and safe exits are necessary in a factory building and that such exits should preferably be smokeproof towers or horizontal exits; that all stairways and other floor openings should be enclosed in substantial fireproof construction; that exits should be situated remotely from each other; that fire escapes passing in front of unprotected windows are of little value; that the operation of counterbalanced ladders should at all times be unobstructed; that doors or traps to stairs which might be used as exits in case of fire should not be locked; that it is advisable to equip factory buildings with an efficient fire alarm which will not only warn employes, but call the public fire department; that fire drills should be frequently and faithfully practiced.

CONSTRUCTION: The building which was the scene of this disastrous fire (November 6, 1915, 1:44 p. m., 285-287 North Sixth street, Brooklyn) was 5-stories and basement in height with a small 1-story extension at the rear and covered a total ground area of 5,000 square feet. The walls were of brick, bearing floor beams and girders and ranged from 20 to 12 inches in thickness. The floors were single, 1-inch thick on 3-inch by 10-inch joists, 16 inches on centers on heavy wood girders running crossways of building, 13 feet on centers, on the side walls and two rows of interior wooden posts. The roof was of composition on joisted construction similar to floors. In the roof was one skylight of wired glass on metal and there was a similar skylight at top of elevator shaft. The finish of walls and ceilings was open except there were metal ceilings on part of the first and third floors. There were a few interior partitions of wood of a minor character.

The main floor openings consisted of an elevator shaft and two flights of stairs. The elevator was enclosed in a shaft of 12-inch brick with a skylight of wired glass on metal at the top and 2-ply doors covered with single lock-jointed tin, not standard but of fair value, at the openings to floors.

The easterly stairs, which were regularly used, were enclosed in a wooden shaft from first to fifth with wood doors to loft spaces. From the foot of the stairs on the first floor a partition ran diagonally to the street (see plan). Under these stairs there was an open flight from basement to first.

The westerly stairs were less frequently used. They started on the first floor at a point about 40 feet from the front of the building and extended toward the street to the upper floors, as shown on plan. These stairs were open except for wood traps at the third, fourth and fifth floor levels. These traps had no automatic attachments. The trap at the fourth floor level was shut and fastened from the under side at the time of the fire. The State Industrial Commission had ordered that a fire resistive enclosure be built about these stairs. The only work that had been done in compliance with this order was on the third floor. Here the contractor had built a framework of second-hand lumber with boards spaced 2 or 3 inches apart, and was covering it with galvanized iron nailed on in large sheets (not lock-jointed). This work was to be submitted for approval and if accepted the enclosure was to be extended to all floors.

The west wall of the building acted as a fire wall between a frame, brick filled 1-story building at the rear, used as a candle factory, a 1-story frame building at the front, formerly used as a garage, and the main building; openings in this wall were protected by wired glass in substandard hollow metal sash and frame windows. A boiler room at the rear of the building was an open story equal in height to the basement and first of the main building and was cut off by a 12-inch brick wall with substandard 2-ply

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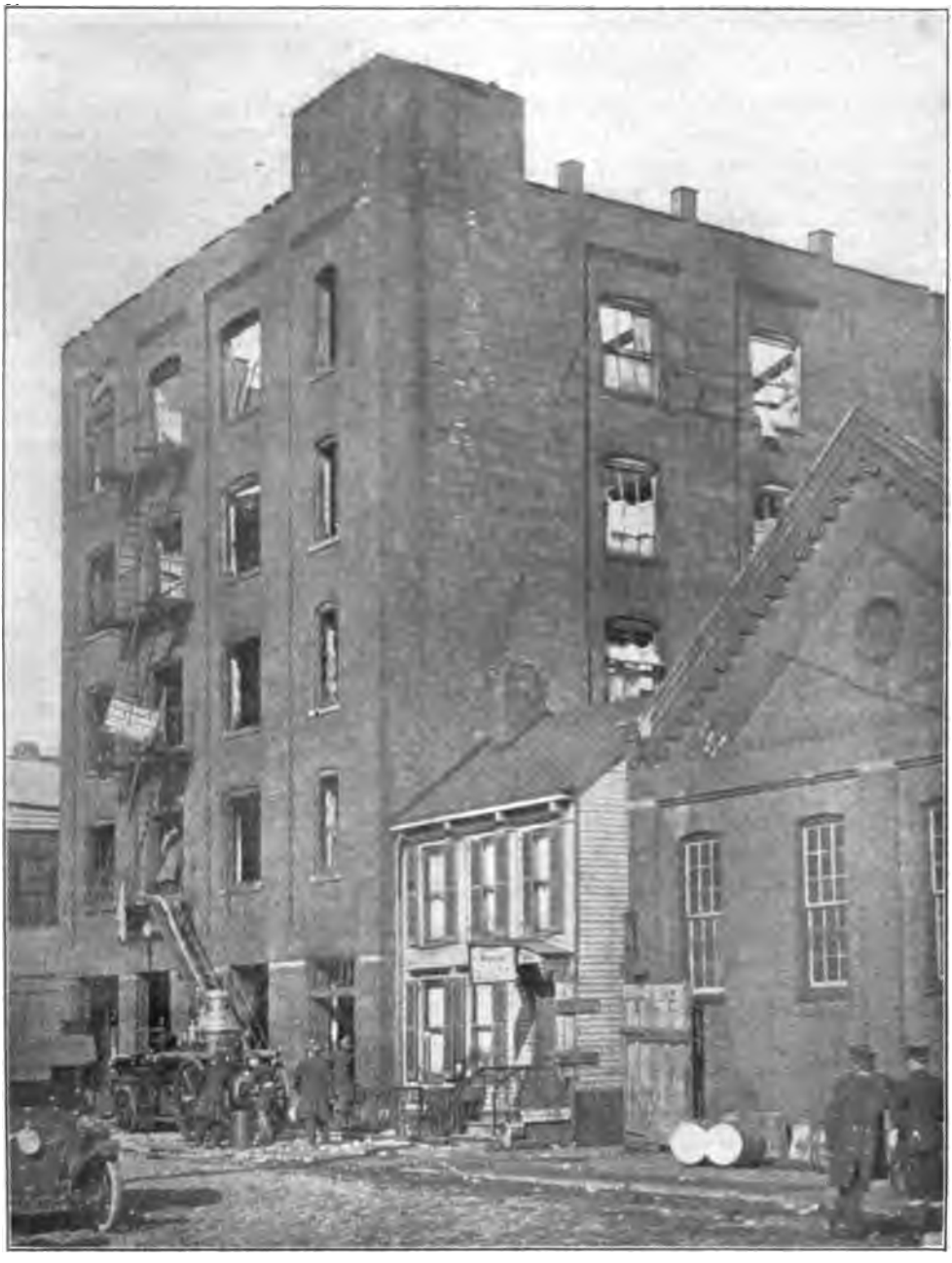

General View of Diamond Candy Company Building after Fire, Showing Fire Escape on Front. Doors Back of Fire Engine Were Open and Delayed Operation of Counter-balanced Ladder. Some of the Wired Glass Windows Show on One Side

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tinclad fire doors at openings to factory.

Windows in the sides and rear of the main building were of wired glass in substandard hollow metal sash and frames of the upper and lower horizontal pivoted type. The glass had only ⅛ to ⅜ inches bearing in the frames.

OCCUPANCY.

Basement—Diamond Candy Company, 4 confectioner's furnaces disconnected, cooling tables, cooling candy in molds.

1.—Same tenant, office, stock, 3 steam cooking kettles, 2 marshmallow mixers by power, boiler and engine room.

2.—Same tenant, 2 ball machines with gas heated spinners attached, rubber connection, coating kettle, 2 drop machines, steam vacuum pan, peanut separator and 1 cream mixer by power; confectioner's furnace, 6 steam heated batch warmers, steam cooking kettles, 2 steam heated chocolate pans; elevator machinery; 35 hands.

3.—Essex Shirt Company, manufacturing shirts, about 90 sewing machines by power, old gas engine not used; 65 hands.

4.—B. L. U. Tailoring Company, contractor on coats, 24 sewing machines by power, 16 gas irons with blowers; 37 hands.

5.—A. Baratz, shirt factory, about 75 sewing machines by power, gas engine in reserve; 60 hands.

ORIGIN AND SPREAD.

Two days preceding the fire 1,000 5-pound pasteboard confectionery boxes and 10,000 pasteboard slips for subdividing these boxes had been received by the Diamond Candy Company and stored on the first story in the stair hall against the elevator wall. The bulk of these materials was still in the hall the day of the fire, also a case of wax paper for wrapping candy novelties and a barrel of condensed milk, these latter being stored against the westerly wall. How the fire started is not known; it did, however, receive its first impetus from the rapid combustion of the stacked candy boxes. The fire was discovered by Harry Koop, Diamond's shipping clerk, who was in the stock room in back of the office and saw the flames through the sash door into the hall. It was seen about the same time by the driver of a cooper's wagon who had called for empty glucose barrels, also by the bookkeeper in the office who felt the heat and turning saw the fire burning through the partition. The man on the wagon drove away without turning in an alarm; Koop ran to the frame dwelling adjoining to the eastward to get out his family who lived there; Diamond's nephew who witnessed the start of the fire from a point on Metropolitan avenue did not turn in an alarm for fear of the police (he was a fugitive from justice); the bookkeeper did not turn in an alarm; other witnesses it would seem were fascinated by the spectacular features of the fire so that it was perhaps ten or fifteen minutes before a policeman turned in an alarm from the corner of Union avenue and Metropolitan avenue, a block away, at 1:44 p. m.; three other alarm boxes were pulled almost simultaneously. In the meantime the fire had spread out into the first and second floors and up the stairs to the upper floors with great rapidity.

There were two flights of stairs in the building (as noted above) and a fire escape on the front, to serve as fire exits. The fire at the start cut off the wood enclosed stairs in which it originated. The westerly stairs were open except for the unfinished enclosure on the third and the non-automatic wood traps on the third, fourth and fifth floors. At the time of the fire the wood trap at the fourth floor level was fastened shut on the under side by a hasp with a bolt with a nut on both ends through the staple. The trap at the third floor was fastened in a similar manner, but a workman who was employed on the stair enclosure removed the bolt and opened this door at the very start of the fire. The fire escape extended in front of the building alongside of unprotected windows; the superior resistance of the wired glass and metal sash at the sides and rear of the building naturally caused the fire to vent itself through these front windows. A glance at the plan will show that although the building was 100 feet deep, all exits were located in the front 40 feet. Certainly none of these exits could be considered reliable, especially in view of the fact that there were 175 persons

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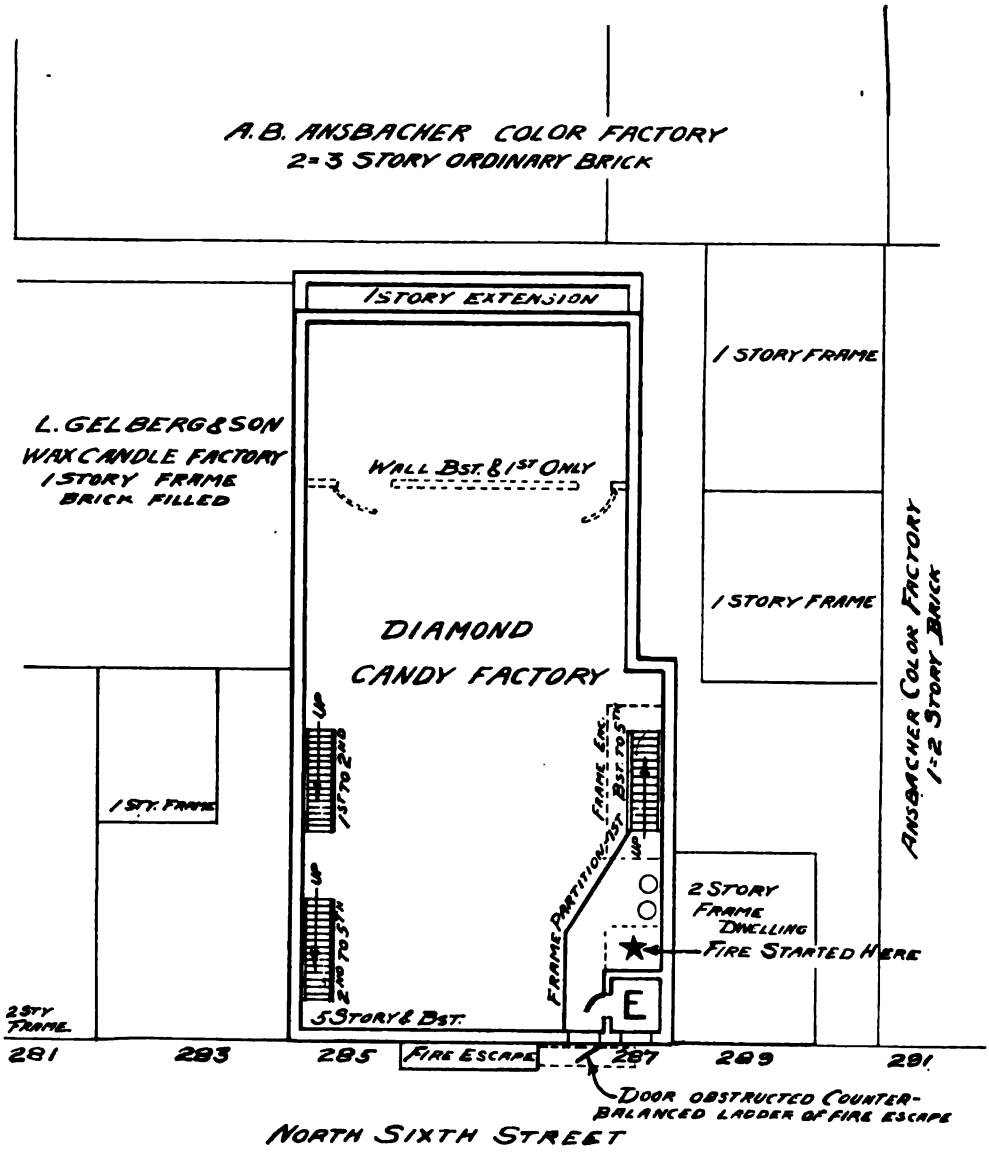

DIAMOND CANDY COMPANY BLDG.
AND EXPOSURES

N.Y.B.F.U. SCALE - 1" = 20'

employed on the upper floors at times.

On the Saturday afternoon of the fire the Diamond Candy Company's factory was shut down and there were only 15 employes on the first and second floors; they and the 65 employes of the Essex Shirt Company on the third, had no difficulty in escaping, the latter by means of the westerly stairs to the second thence through the windows to the roof of the buildings adjoining, or down the fire escape. The fire in the main stairs and the locked trap door on the other stairs at the fourth floor left only the fire escape as a means of exit to the 97 employes of the fourth and fifth floors. Employes worked for fifteen minutes in trying to tear open the fastened trap, but succeeded

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only in opening it sufficiently to allow five persons to squeeze through. In the meantime those who crowded the fire escape were delayed because the counterbalanced ladder intended to reach from the second to the ground was caught by doors on the first story which swung outward. Koop, returned after seeing his family safely out of the frame building adjoining, and closed these doors, allowing the ladder to descend and some employes escaped this way. Flames and dense smoke were, however, pouring out of the doors and windows and many remained huddled on the fire escapes afraid to descend.

HOW THE FIRE WAS FOUGHT.

When the first fire companies arrived the fire was in complete possession of the first and second floors and smoke was pouring out of all the upper windows, in fact Acting Battalion Chief Edward Conolly, on his way to the fire, realized its magnitude when a block away and sent his driver to turn in a third alarm, which registered at 1:49 p. m. Fire companies entered the first and second floors, but their streams had no effect on the fire and they were forced to retire, subsequently no fire fighting was done inside of the building. The truck companies assisted by members of the engine companies, devoted their energies to rescuing the employes on the fire escapes by ladders and life nets, saving 37 persons in this way. A fourth alarm was sent in at 2:09 p. m. There were 14 engine companies and four hook and ladder companies at work upon this fire. The fire was fought by three 1½-inch streams from deck pipes of hose wagons and a 1¼-inch stream from the street; by three 1¼-inch and one 1⅛-inch streams from the roof of the 1-story extensions to the west; by two 1¼-inch and one 1⅛-inch streams from the roof of the color factory to the north, and by two 1¼-inch streams from the roofs of buildings to the east. Most of these lines were in use for an hour and a half; a few lines were kept on the ruins for nearly 4 hours.

DAMAGE.

The building is gutted on the easterly half, all floors above the first having collapsed. Ou the westerly, northerly and street sides, where the most water was thrown, portions of the floors are still standing though somewhat precariously. The fire apparently did not enter the boiler room at the rear of the first floor although the fire doors in the dividing wall were open, nor is there any marked evidence of fire in the basement. The walls of the building are all standing, and considering the severity of the fire, are in good condition. The windows in the north, east and west walls were glazed with wired glass in substandard hollow metal sash and frames. The wired glass in practically all of these windows failed, as might be expected under the severe heat, although this was doubtless accelerated by the fact that the glass had only ⅛-inch to ⅜-inch bearing in the frames; doubtless many panes were knocked in by the impact of the powerful hose streams. Many of the sash were found inverted. The gravity catches evidently did not operate when the fuse links allowed the windows to close, there were no stops on these windows, and the impact of the hose streams overturned the sash. Stocks and machinery on the floors above grade were largely destroyed.

The absence of wind, the protection afforded by the wired glass windows and the excellent fire fighting prevented the spread of the fire to the frame buildings adjoining or three to five feet distant, and through the unprotected windows of the color factory ten feet to the northward.

LOSS OF LIFE.

Twelve persons lost their lives in this fire, 8 by suffocation or burning and 4 by jumping to the street. Those burned to death were found near or on the fire escapes on the upper floors. Thirty-eight persons were overcome by smoke or were injured by jumping to the street or into nets. Some missed the nets altogether; in other cases two or three persons would strike a net at once breaking it or making it impossible to hold.

. [The conclusions reached by the Bureau of Surveys of the New York Board of Fire Underwriters on the facts related above, appear in full at the beginning of this article.]

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Modern Fire Exit Facilities

By Giles P. Greene

"THE so-called fire-escape." Repeatedly has this qualification of the word "fire-escape" proven to be not only justifiable but accurate and truthful in every respect. The test of service has shown that in this country a vast majority of fire-escapes have been thus not only "so-called" but "falsely called." They have not been fire-escapes at all—they have only been called fire-escapes. In countless cases they have failed completely of their purpose and in countless other cases they have, by the false sense of security which the misnomer "fire-escape" inspired, swelled the lists of dead and injured. Occasionally, and alas, all too infrequently, a sudden fire with a serious menace to life has been deprived of its human prey by an adequate and efficient means of escape for the occupants of the building. It has been shown on these occasions that careful and sincere study of the problem is capable of producing a fire exit which is a match for the most unexpected and severe conflagration.

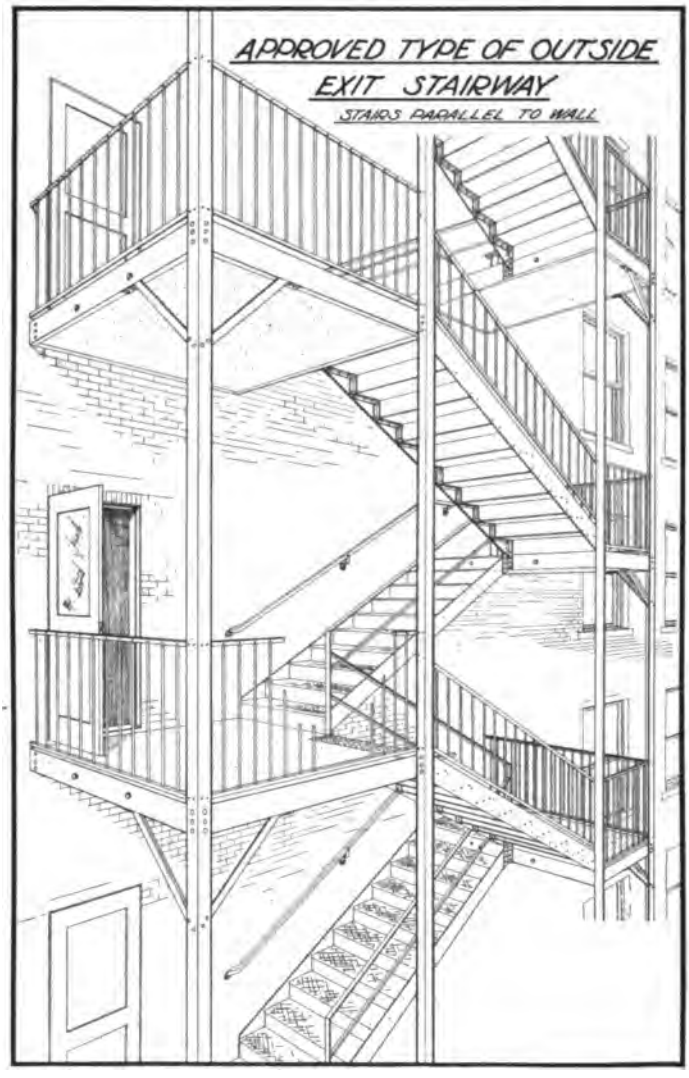

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Plate 1

In the November issue of SAFETY ENGINEERING, Mr. Louis H. Schene showed in his article entitled, "The So-called Fire-Escape," the striking prevalence of inadequate means of exit from factories, apartment houses and loft buildings in New York City. It is my purpose to present for consideration some constructive suggestions along the lines of adequate fire exit facilities. A discussion of this nature should omit from any consideration whatever that type of exit which has been characterized as "so-called"—that is to say, an exit consisting of open gridiron balconies connected by iron ladders or

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stairs with open treads and lacking risers, and having unprotected window openings on, adjacent to, or underneath the balconies or stairs. This type of fire-escape has upon occasion been instrumental in saving human life, but the fire exit problem has now reached a stage where it is absolutely incumbent upon architects and owners to equip their buildings with means of exit which not merely may, but which can be positively depended upon to furnish a safe means of egress in case of emergency. It should be considered as much a crime to allow a building to be equipped with fire-escapes of doubtful safety as it is to permit an ocean liner to put to sea with life boats whose wood is rotten.

There are certain general characteristics which a safe fire-escape must have. It must be so situated that it is naturally and easily accessible from all parts of the floor and must be so reached from the inside that there is no possibility of congestion at the exit door. The door and door frame should be sheathed with metal, the door should open outward and should be equipped with spring hinges and a latch easily released. The platform should be of solid non-combustible floor construction to protect persons from possible flames and heat from below. Platforms should be drained to prevent puddles of water which might freeze. Guard rails of ample height should be placed around the outer edge and enclosing the stair opening. The stairs should have a descent not greater than 45 degrees, with closed risers and preferably non-slip treads. Window openings should be, if possible, not nearer than ten feet from the fire-escape, and windows necessarily nearer than this distance should be equipped with metal sash and wire glass. Finally, the fire-escape should lead directly, or through a fireproof passage, to the street. The ideal of the foregoing conditions should be approached as nearly as existing conditions will permit in buildings already built. In new buildings, the

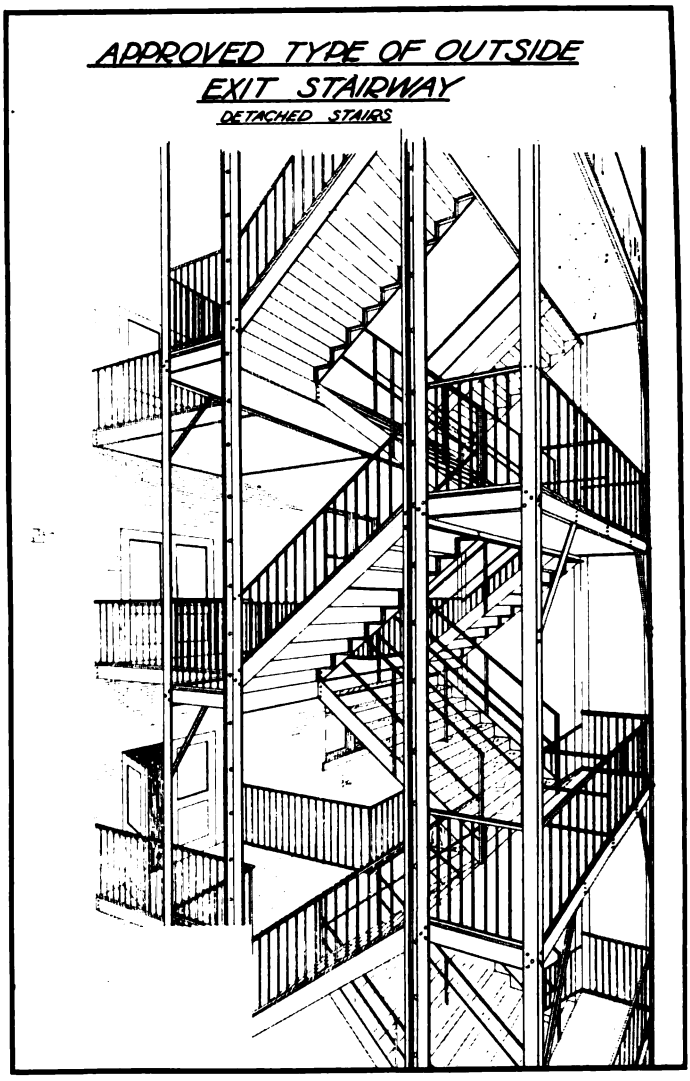

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Plate 2

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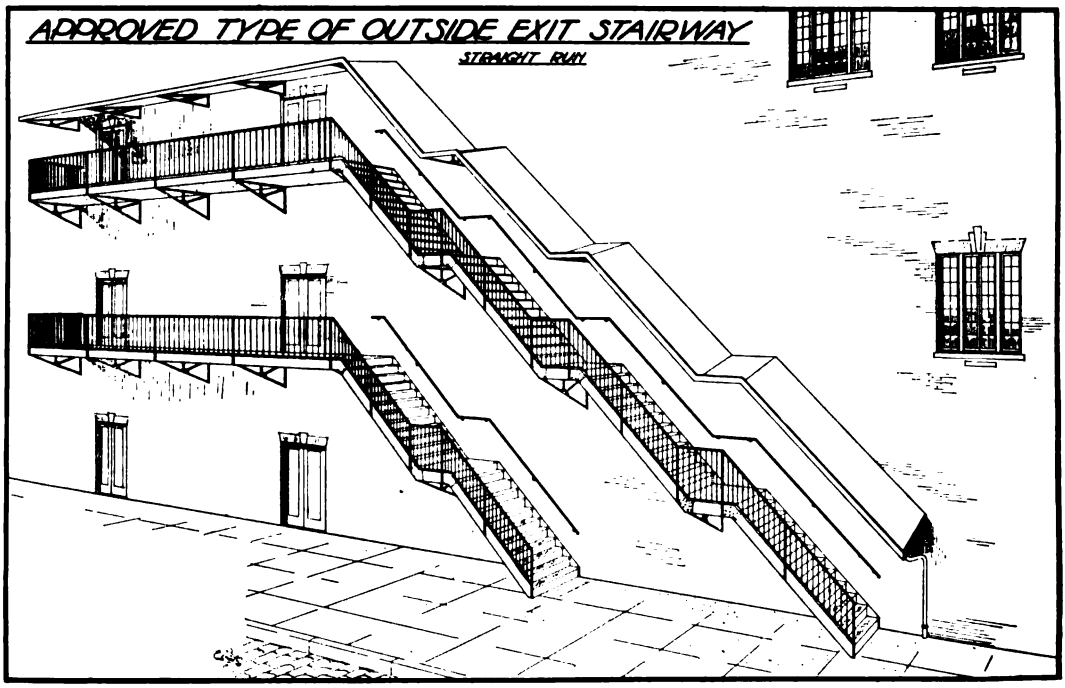

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Plate 3

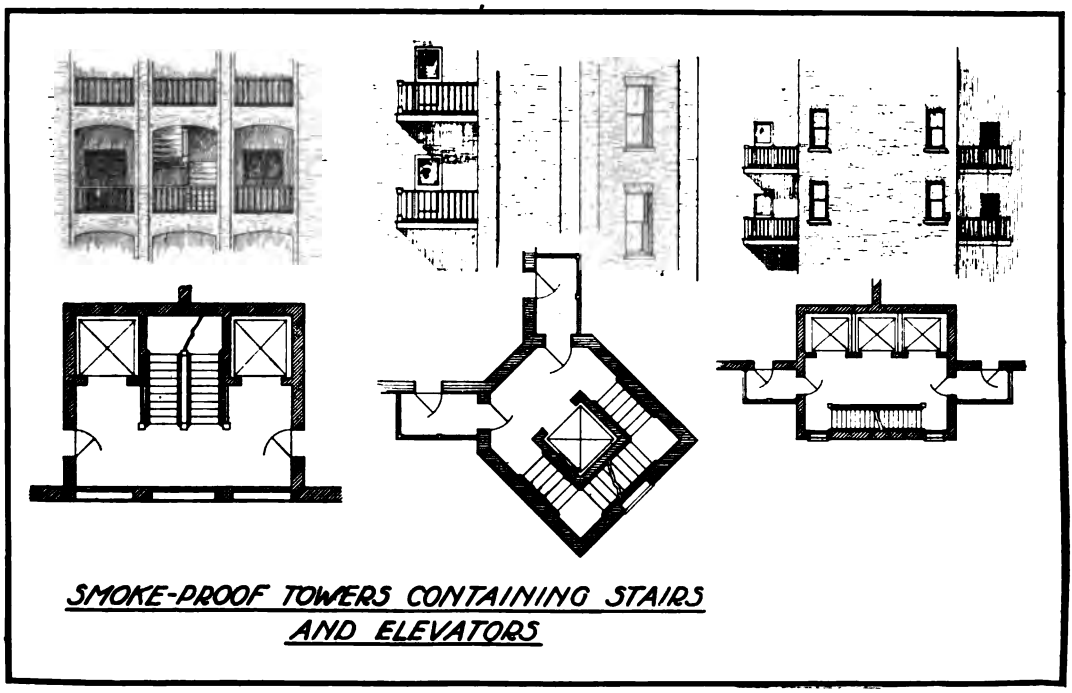

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Plate 4

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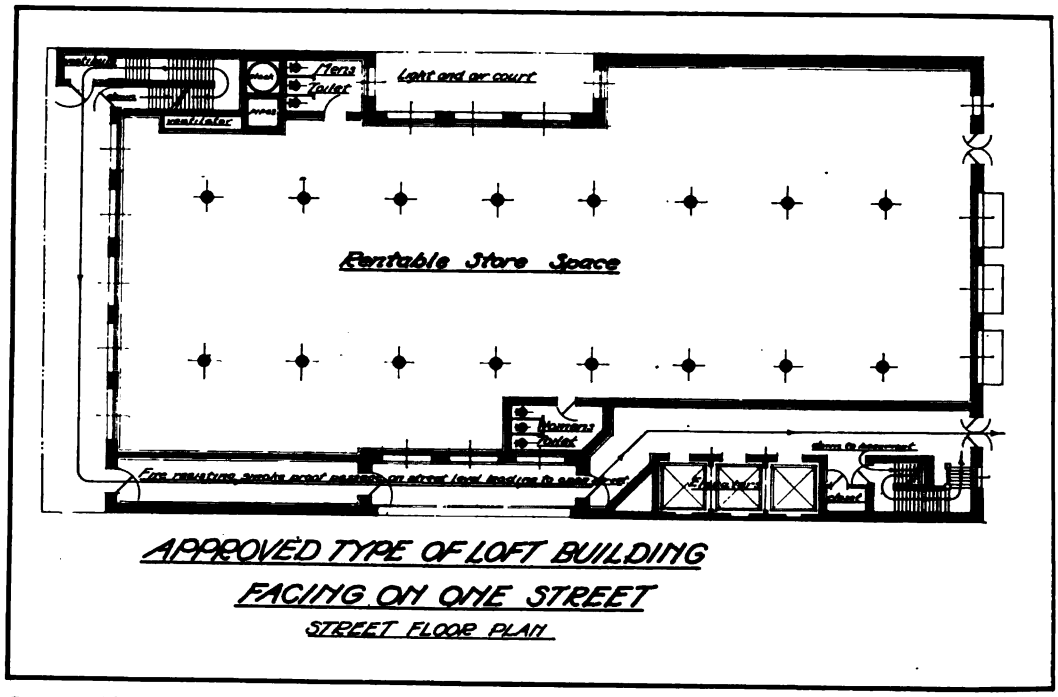

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Plate 5

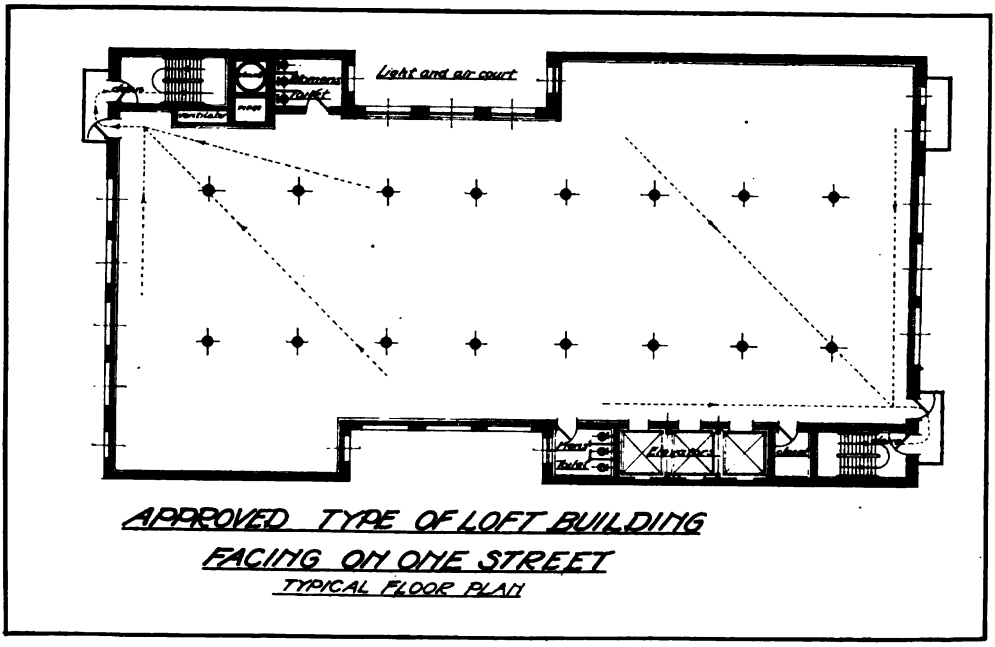

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Plate 6

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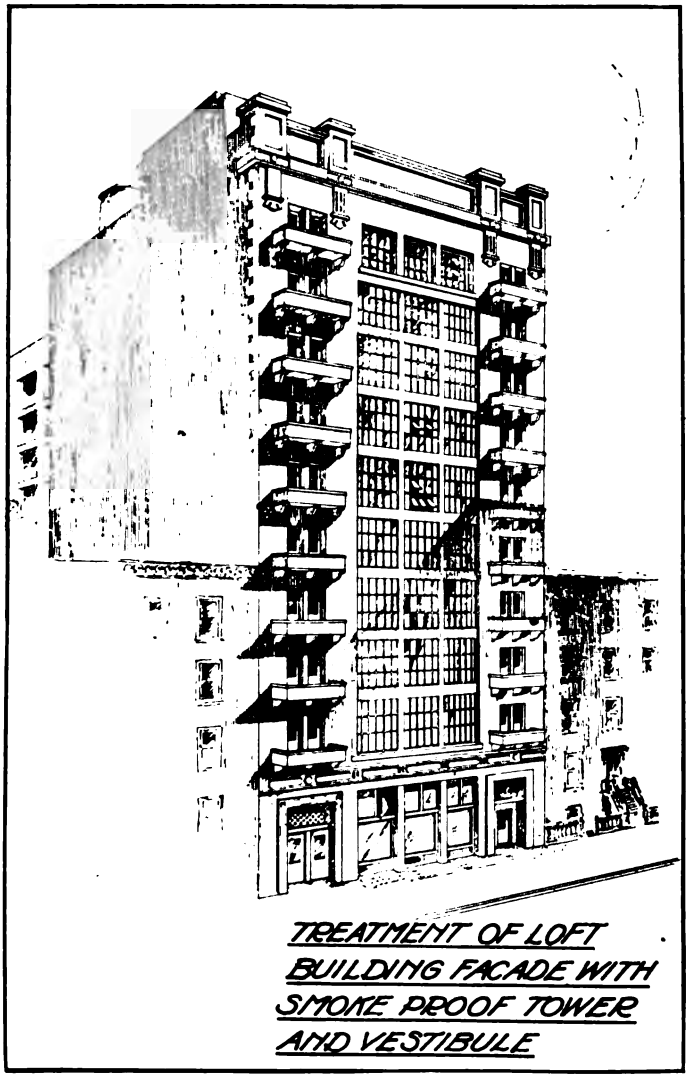
spirit of these propositions should be strictly adhered to.

The outside exit stairway, whether on an existing building or as part of a new building, naturally furnishes the first consideration. The most common type of outside exit stairway is that whose stairs run parallel to the wall of the building. Such a fire-escape is shown in Plate 1. It is a steel-framed structure with terra-cotta arch floor construction for the platforms and closed metal treads and risers on the stairs. The latter are of easy descent, equipped with non-slip treads and guarded with hand rails of ample height. A sufficient amount of space is left between the bottom step and the door opening so that persons descending from the floor above will not interfere with persons coming out of the door upon the platform. The door openings are the only openings adjacent to or underneath the platforms and stairs. Doors and door frames are of fire-resisting construction.



TREATMENT OF LOFT BUILDING FACADE WITH SMOKE PROOF TOWER AND VESTIBULE

Courtesy of Universal Safety Standards. Copyright.

Plate 7

The exit stairway shown in Plate 2 has certain advantages over that shown in Plate 1. This stairway is of large capacity and is especially adapted to buildings holding a great number of occupants. Other advantages of this type are that it stands free of and away from the building; that those persons coming from above do not descend in the face of those coming out of the building upon the platform and that the circulation downward is in a sense isolated from the immediate rush through the door.

Plate 3 illustrates the type of exit stairway known as the straight run. This type is adaptable principally to buildings having few wall openings and is largely used on theaters. The advantage of this exit is that those using the stairs do not make any turns in their descent to the ground. The stairs, however, are broken with landings at intervals of approximately 12 risers. It is especially important that a fire-escape on a theater should be so constructed as not to be rendered

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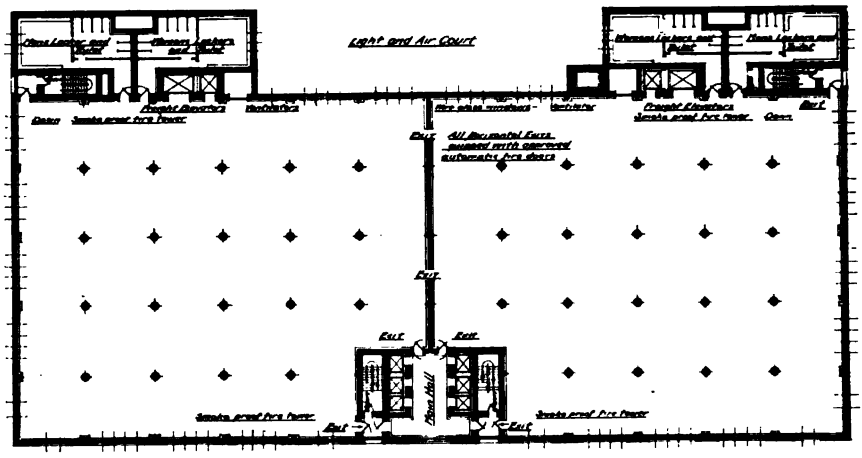

APPROVED TYPE OF LOFT BUILDING FACING ON THREE STREETS

TYPICAL FLOOR PLAN

Courtesy of Universal Safety Standards. Copyright.

Plate 8

useless by smoke and flames from below and for this reason no openings whatever, except exits, should be permitted at any point beneath the balconies or stairs and preferably none at all. All such exits are provided with fire resisting doors hung on spring hinges and the balconies are of steel and concrete or terra cotta construction. This type of escape is so directly exposed to the weather throughout its length that it is necessary to protect it with a roof.

Where an existing building must be equipped with a fire-escape the examples just quoted accomplish this end most efficiently. The modern smoke-proof tower, however, is the most safe, sane and sightly solution of the fire-escape problem. The theory of the smoke-proof tower is the incorporation in the building itself of a fire-resisting stair tower from the roof to the ground, having no openings into the building proper and reached by the occupants at floor levels only by first passing through an open air passage or balcony. Such a tower affords an exit passage which is as smoke- and flame-proof and at the same time as accessible as it is possible to build. The design of smoke-proof towers may be infinitely varied but certain basic principles must be strictly adhered to. The tower should preferably open directly on the street. Where the tower is situated in the rear of the building and it is necessary to pass through the building to the street, a fire-resisting smoke-proof passage must be built. The walls of the tower from basement to roof should be of heavy fire-resisting construction. In buildings which are not of fire-proof construction throughout, the walls of the tower should be self-supporting, non-bearing walls, and in no way tied to any part of the building which in collapsing might cause their rupture. All material used in the construction of the doors, landings, stairs and railings should be non-combustible. The lighting of the tower should be on a circuit independent of the lighting circuit used in the building and preferably introduced into the tower through a separate main from the street. Where a passage is used instead of a balcony, it should be as

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open to the air as possible, and in the case of both balcony and passage, adequate measures should be taken to provide drainage. Doors from the building to the balcony or passage should swing outward from the building and doors into the smoke-proof tower should swing inward. The landings in the tower at floor levels should be as wide as the width of the stairs plus the width of the door. The door into the tower should in no case open in the face of the stairs descending from the floor above.

An economical use of space, where the principal means of entrance and exit to the various floors of the building is designed as a smoke-proof tower, is shown in each of the three figures of Plate 4. Hall space and elevators are introduced in addition to the stairways without lessening the efficiency or protection of the tower. The elevator machine in such case is preferably installed within the fire-proof walls of the tower or in a directly adjacent fire-proof room accessible only from the tower.

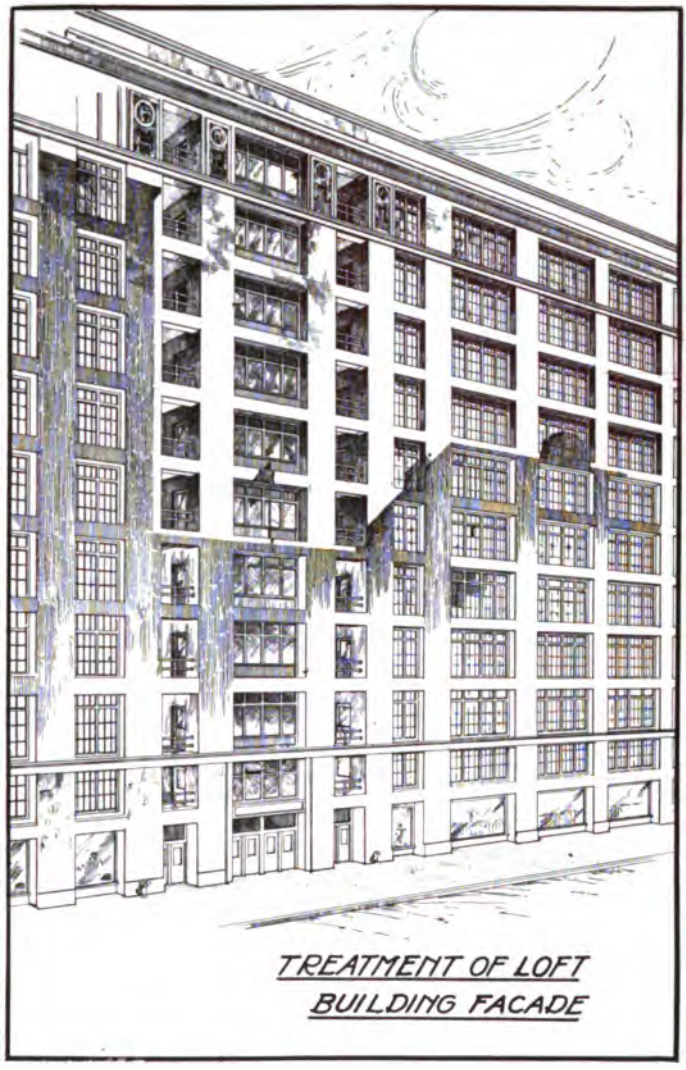

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Plate 9

The employes or occupants of the building through frequent use of this tower are likely to seek it the more easily and naturally as a means of escape. The number of such towers must be sufficient to amply accommodate the occupants of the building. The first figure to the left shows the tower situated between two parts of a building separated by a fire wall and accessible from either side. The tower contains hall space and two elevators with stairs between. The halls at each floor level are directly open to the air. The figure to the right is of the same general type but is entirely enclosed in walls and is accessible from either part of the building by means of open-air balconies. The tower contains three elevators on the inside and stairs next the outside wall and is lighted by windows at each floor level. The figure in the center shows a corner tower with stairs and single elevator in the stair well. It is reached by open-air balconies leading to two entrances and, as shown, is lighted by windows between each floor level.

The street floor plan, a typical floor

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plan and the street elevation of a loft building facing on one street are shown in Plates 5, 6 and 7. Where a loft building in a city is situated in the middle of a block and occupies the entire width of its lot on the street side, the designing of its fire exit facilities presents something of a problem. There are three alternatives. There may be smoke-proof towers on the street side sufficient to accommodate the entire number of occupants of the building, there may be similar towers in the rear of the same capacity, or the means of exit must be divided between the front and rear. The latter arrangement is shown in Plate 5. In this building are incorporated two smoke-proof towers placed at diagonally opposite corners of the building. The rear tower leads to a rear court and from this court a fire-resisting, smoke-proof passage leads directly to the street. The fact that the incorporation of a smoke-proof tower in a building will not interfere with the architectural treatment of its facade, is illustrated in Plate 7. Open-air balconies form the means of communication between the floors and the tower and a balanced treatment of the facade is obtained by means of similarly placed balconies on the other side.

The typical floor plan of a large loft building facing on three streets incorporating smoke-proof towers is shown in Plate 8. The building is divided into halves separated by a fire wall. The elevators and stairways forming the main entrance to each floor are accessible from each half of the building and each stairway is built in a smoke-proof tower. In addition to this means of escape supplementary smoke-proof towers are built in the rear corners of the building, giving as in the previous case, an equable distribution of exit facilities and ample means of escape for a large number of occupants. In case of fire, if the occupants of a floor find the elevator inoperative, they can reach the stairs without again entering the building proper. The use of an open-air passage as is shown in Plate 9, permits an equally desirable architectural facade treatment.

A building with sufficient and well-planned fire exits, whether they be outside exit stairways or smoke-proof towers, has been found to be a good investment for the owner from every point of view. It is a well-known fact that a building which is planned carefully and built completely at the outset, costs less ultimately than one to which additions of any nature are made at any subsequent time. To erect a building of sound construction, providing carefully and well for the safety of its occupants, is good business; but aside from this consideration the owner should be led to the same point of view from a sense of duty. In only a few instances do laws now compel building owners to equip their buildings with fire exits similar to or as efficient as those discussed in this article. Up to the present time frequent and continued fire disasters have failed to awaken civic consciousness to the necessity for exhaustive and stringent requirements of this nature. Such an awakening is bound to come. The time is not far distant when it will be considered a humiliation and a disgrace for the owner of a building to be notified by a municipal building department that the fire exit facilities in his building are inadequate.

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The Safety Idea as Related to Credit

By Charles E. Meek

President of the National Fire Protection Association and Past President of the National Association of Credit Men

Proceedings of the Fourth Annual Safety Congress, National Safety Council.

DEFINITE results are always welcome to those seriously interested in the work of an organization like the National Safety Council.

Your records are doubtless filled with a mass of evidence of such a convincing nature that the doubting Thomases, of which there is always a plentiful crop, are in danger of being persuaded that there really is something of value in co-operative action.

My eyes were opened as to what the safety movement really means when, a short time ago, I visited a large manufacturing plant and in the course of conversation with the company's financial manager was told that less than two years ago the company added to its staff of experts a safety engineer, and the result was highly satisfactory, for at the end of the fiscal year it was found that less than one hundred dollars had been paid out to injured employes. I was told that every inch of this vast plant, where thousands of men are employed, had been treated to a full dose of safety methods. This treatment not only produced actual results in reducing the chances of accidents to the minimum, but it eased the minds of the managers, giving them more opportunity for the development of their regular work. The safety expert of this company is consulted regarding every proposed change in the plant and its machinery, and nothing is left undone for the protection of life and limb.

There is an important consideration which should not be lost sight of, namely, the effect of safety methods on the expense account. The highly successful manufacturer is the one who is able to keep down the cost of production; protection against accidents will help to accomplish this.

It is impossible to find a single argument why the introduction of the safety principle into any business is not a good investment. In fact, there is everything in its favor. At the same time you are doubtless experiencing the same uphill fight in the development of your work that other organizations have experienced. This should not be a cause for discouragement, but rather should be an incentive. There is more satisfaction in winning a hotly contested fight than to have an easy walk-over.

For twenty years the National Association of Credit Men has been engaged in educating our business men in the application of safety principles to the granting of credit. It has endeavored to impress upon its members that the giving of credit should be based upon substantial facts, and that the "take a chance" idea is gambling pure and simple. The credit man of today keeps in close touch with the business of his customers. He watches every development and does not hesitate to criticize the weak points, or to commend the strong points in the policies of those with whom he deals.

A highly important factor in credit work, and one strongly emphasized of late years, is that of fire insurance and fire protection. It is on this common ground that the National Association of Credit Men and the National Fire Protection Association meet. The credit men discovered that many of their customers either neglected to protect themselves against loss through fire or handled their insurance so indifferently that it was oftentimes of no value. A vigorous campaign was started, in which printed matter and speakers were used to show the neces-

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sity for full insurance placed with responsible companies. No opportunity was lost to impress upon every one that a credit unprotected against danger of loss through fire belonged to the "take a chance" class and should not be tolerated. Today the relation of fire insurance and fire protection to credits is on this basis: Insurance reinforced with fire prevention methods stands first; insurance alone ranks next; the use of fire prevention methods without insurance is third; and the absence of both insurance and fire prevention methods removes every excuse for the extension of credit. Fire prevention methods not only reduce the hazard, but also the cost of the insurance. In some instances the latter is probably the only incentive to their use, but in many cases a broader view prevails and consideration is given to protecting life and removing so far as possible the unpleasant experience of having a life's work destroyed.

While great progress has been made by the National Association of Credit Men in this direction, the work is by no means finished. It has, however reached a point where it is handled with less difficulty. Why not seize the opportunity to advance another step by encouraging the employment of safety methods, and place a premium upon their adoption, in the same manner as outlined in the reference to fire protection? By adding to the financial statement-form a single question, the attention of thousands of business men will be attracted, many of whom will realize the value of the safety movement. There is every justification for this, for the reason that bankruptcy has frequently followed accidents where loss of life or serious injuries have occurred; and it is the duty of every credit man to use his influence toward the elimination of every cause of bankruptcy. An employe who has met with a preventable accident is no longer an asset, but belongs in the liability column, and it is the overloading of this side of the ledger which results sooner or later in failure. The clean, light workship, where every precaution against fire and accident is taken, is evidence of good management, and under such conditions the product is bound to be superior, all of which tends to influence a higher credit standing.

Employers are doubtless often discouraged by the lack of appreciation on the part of their employes, who fail to use the means provided for the safety of their lives and limbs. The other day I stood in front of a large plant, the entrance to which was crossed by several railroad tracks. A subway had been provided, at each end of which stood a prominent sign reading, "Don't Cross the Tracks—Use the Subway." As it was close to the noon hour, I waited to see how many would follow the sign and was not surprised to see it entirely disregarded, for not a single person used the subway. A splendid exposition of our "jay-walking" habit.

It is estimated that 35,000 workers were killed and 2,000,000 injured during 1914.

During the same year $236,000,000 worth of property was destroyed by fire.

In the same period 18,000 business failures occurred, with liabilities of $358,000,000.

This tremendous waste is being fought by your organization together with the National Fire Prevention Association and the National Association of Credit Men. It is an uphill fight full of discouragement; and in spite of the vigorous campaign carried on for years against fire we keep on burning up about the same amount annually.

The two organizations I represent have to an extent solved this question. They have developed from their membership men who can intelligently and interestingly discuss questions pertinent to their policies. These men have invaded the public platform, the meetings of trade organizations of every character and the school house. And the last-named is an effective working place, for if we get the youngster to thinking the right way, we are saved the hard job, later on, of converting a grown-up, and are building for the future prosperity of America and its people.

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Means and Desirable Extent of Instruction to Workers in First Aid

By Dr. J. M. Shields
American Red Cross, Washington, D. C.

Proceedings of the Fourth Annual Safety Congress, National Safety Council.

I HAVE taken the liberty of discussing the last part of the title of this paper first, as on account of its importance I think it should come first.

The instructor in first aid should always be a qualified surgeon or physician, and in his lectures or talks, he should not teach too much anatomy. The outline or gross anatomy of the human body is sufficient with some practical physiology and the working functions of the principal vital organs. He should shear his language of all technical and medical terms possible, using practical comparisons, such as the stopping of bleeding is like stepping on a hose: the bone represents the ground, the artery the hose, the compress the foot. Also lay special stress on the abuse, danger and damage of tourniquets, especially in venous bleeding, by the use of bell cords, rope, fish lines and wire.

They should be instructed not to wash wounds, excepting in case of very greasy wounds, when gasoline can be used. They should be instructed to paint the wound with a weak solution of iodine, or to use iodine ampoules, and apply a plain sterilized dressing. They should be told how wounds become infected, that the germs are not usually on the thing which cuts or causes the wound, nor to any appreciable extent in the air, but the germs are on us, under the finger nails, on the hands and clothing, that a handkerchief that has been used on the mouth and nose doesn't have 57 varieties, but 27 kinds of bugs, and that Nature does not need carbolic acid, iodoform, bichloride or that popular thing, "wind and water peroxide," to heal a wound: that punctured wounds, such as stepping on nails, running wire into the hand, or wounds made with screw drivers, are serious on account of what the nail or wire pushes into the flesh, and the best first aid is the immediate services of a doctor in this particular injury.

It is not their work to set fractures or reduce dislocations, but simply to apply temporary splints and retaining bandages.

In burns they should cover the burned surface as quickly as possible with moist picric gauze, linseed oil and lime water, or in an emergency with any kind of oil used on gauze or clean cloth. Never use absorbent cotton or waste next to the burned surface. The workers should be emphatically told of the serious danger of eye injuries, and of foreign bodies in the eye and their prevention by the use of goggles; not to allow sharpened or burnt match sticks, toothpicks, pencils, knife blades, steel picks or men's tongues used in their eyes, but harmless things, such as a clean horsehair loop, absorbent cotton on a toothpick, a corner of a clean handkerchief, or to go to a doctor immediately.

They should be taught and thoroughly drilled in artificial respiration, the "prone method," together with the danger and avoidance of electrical contact, the treatment of surgical shock without giving a bath of whiskey, in fact, not to give alcohol at all in accidents.

They should be taught simple methods of the care, covering, handling and transportation of the injured; also the practical stretcher drill.

As a rule not much roller bandaging should be taught, as it has been brought to my attention that patients have been delayed in getting to the

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Teaching "First Aid" to Railroad Mechanics. How to Stop the Flow of Blood from a Severed Artery

hospital by men applying a fancy bandage. Few and simple dressings should be used. The shell wound compress and bandage, the small cut and finger dressings are very practical and quickly applied and the use of them should be taught.

Just here I am glad to tell you of the recent organization of the American First Aid Conference. This organization is composed of representatives of the Army and Navy, public health services, prominent chief surgeons of railroads and other large industrial plants. Its sole purpose is to standardize first aid materials and first aid training so that in the latter we may have in this country a large trained personnel which could be used should the emergency arise.

The workers should not be taught to give medicine, as very little medicine is required in accidents: possibly the only remedy would be aromatic spirits of ammonia to be used in place of whiskey where a stimulant is required. The use of the hypodermic needle should never be taught and its use should be emphatically condemned, also the use of any drops in the eye.

The men should be taught how to care for accidents peculiar to their occupation and the plant in which they work.

There are a number of methods used in teaching first aid, of which illustrated lectures and practical demonstrations form the one most generally used. The lectures are illustrated by lantern slides and moving pictures, anatomical charts and diagrams. Some teachers use the mounted skeleton. I hardly think the entire skeleton is necessary, the bones in the arm and leg and perhaps the ribs, would be sufficient. Practical demonstration in the treatment of specific accidents on the living model is, I think, the best way

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Teaching "First Aid" to Railroad Mechanics. Demonstration of How to Save the Life of an Electrical Shock Victim

to impart first aid so that it will be permanent and bring results in real accidents.

I give the following as a suggestive plan: Suppose, for example, that first aid has never been inaugurated in the mine, plant, factory, shop or the railway division point. A mass meeting is held in the plant, or a convenient hall, at which the surgeon or physician gives a condensed lecture, illustrated by practical demonstration aided by several employes. Methods could be shown of arresting bleeding, treatment of wounds, applying temporary splints, treatment of shock, artificial respiration, especially in an electric shock or gas poisoning, practical ways of carrying and transporting the seriously injured.

At the close of the meeting volunteers to join the first aid class should be asked for, offering such inducements as Red Cross first aid certificates, merit marks, names placed on the honor roll and prizes. The men who volunteer ought to represent various departments and sections of the plant. The class is then organized, electing its own officers if thought best, except the surgeon or surgeons who instruct the class; these should be selected by the management, and I think the surgeon should always have an assistant to take his place in unavoidable absence. A regular specific series of lectures should be given, based on and conforming to the various Red Cross first aid text books. There are, as you perhaps know, a Miner's, Railroad Man's, Industrial, Police and Women's editions. The Industrial edition is printed in four foreign languages. These classes should not be held oftener than twice a month. The meetings should not last over an hour and a half. The lecture, say from 30 to 45 minutes, and the rest of the time

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devoted to practice in first aid to imaginary injuries, drills and answering questions, the doctor in charge supervising the practice.

The classes should not be too large, say not over fifty members. Where the plant is large, the men could be divided into groups of fifty. New classes can be formed and taught each year. Limiting the size of the class to fifty has worked out very practically in my work with the Associated Bell Telephone companies and the mining companies.

The men should be encouraged to take the Red Cross examination upon completion of the course, and usually they are eager to do so, prizing their diplomas very highly. These examinations are held locally by an examiner appointed by the Red Cross, and are very practical in character. I might also mention that the Red Cross has two special funds from which cash prizes are awarded for meritorious first aid workers, one for railroads and the other for other industrial workers.

Wherever there is a well-organized "safety first" department, with a number of members, men for first aid training can and ought to be obtained from this department without any mass meeting, as safety and first aid go together.

Everyone engaged in safety work realizes, I think, that the human element is the most important in accident prevention, and I know by years of experience that first aid training is of untold value in safety work. This can be proven by the statistics of several large corporations. In two instances where systematic first aid training has obtained for several years, fatal accidents have been reduced 50 per cent. non-fatal accidents 30 per cent, and the time lost after accidents reduced between 30 and 40 per cent.

Automatic Traffic Control

A STREET traffic control system that speeds up traffic 20 per cent, is installed in Cleveland at a busy corner. Electric lights are placed on the right hand side of each street facing oncoming vehicles. A red light denotes "stop" and a green light "proceed." The red light is shown on the near corner of the crossing and the green on the farther corner. The sides of the booth are glass and this enables the officer who controls the switch to see the traffic in all directions. The switch is so interlocked that is is impossible to give conflicting signals.

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A Safety Device for Electric Vehicles

By H. E. Ackerly

Engineer of Safety and Welfare, Eastman Kodak Company.

DESPITE the care exercised by trained drivers, the switch on an electric truck is occasionally thrown in while the controller is off the neutral point. This act has caused not only property damage, but frequently personal injuries, and occasionally death.

The fact that this accident hazard existed led the Eastman Kodak Company, which operates a fleet of electric trucks, to develop a safety device to prevent such an accident. The mechanical engineering department of the Kodak company has just completed the installation of the device on its trucks. With this mechanism it is absolutely impossible to close the main switch when the controller is off the neutral point. The device has not been patented, as the designers wished any one caring to do so to take advantage of it, either in building new trucks or in equipping those now in use.

The photographs show one of the devices mounted in a box similar to a driver's seat in the rough. The photographs are taken from the front. The driver sits at the left hand side of the box, operating the control lever (B) shown in Figure 1, with his left hand. The rheostat selector shaft (A), to which the controller lever (B) is attached, also carries a sector (C) which prevents the operator from engaging the switch except when the selector is at the neutral point. A lever (D) has been attached to the main switch from which the handle has been removed. This lever has a pawl (E). There is a slot in the sector (C) through which the pawl (E) on the lever actuating the switch must pass in order to close the switch. The sector (C) is so located that when the switch is closed, the rheostat selectors are all at the neutral point. As the pawl (E) is held forward by a pressure spring, the switch lever can disengage the switch at any position of the selector.

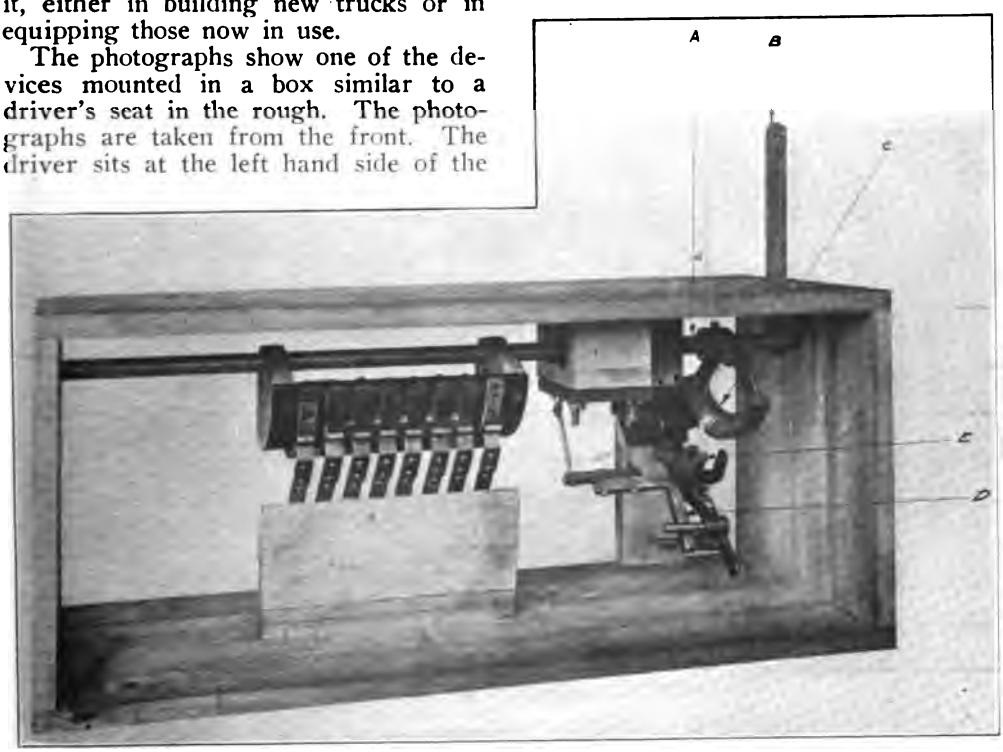

Fig. 1. Showing Main Switch Open and Pawl Disengaged

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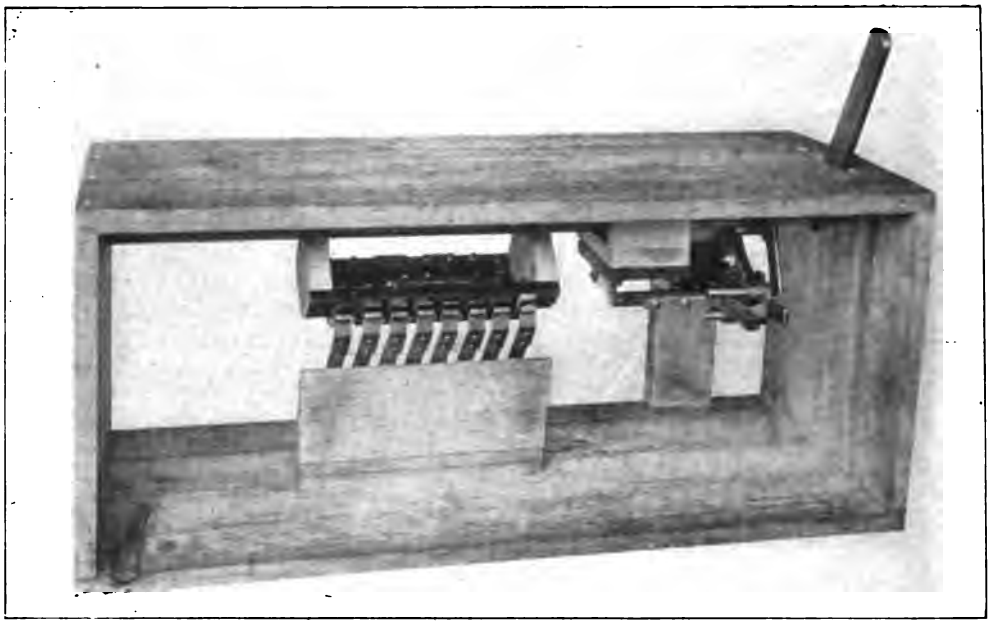

Fig. 2. Main Switch Closed, Switch Arm Engaged with Sector

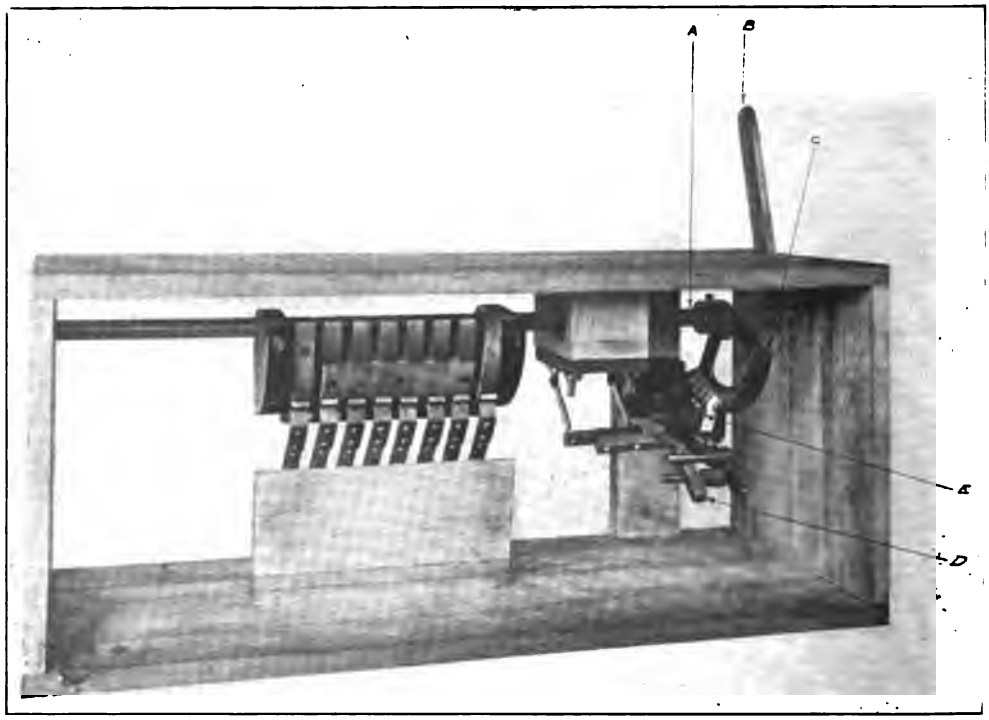

Fig. 3. Main Switch Open, Switch Arm Partly Disengaged, Sector Not at Neutral Position

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Linemen and Their Hazards

By Charles B. Scott

Middle West Utilities Company, Chicago

Proceedings of the Fourth Annual Safety Congress, National Safety Council.

ACCIDENTS to employes of electric light and power properties show a very large percentage to the linemen as compared with those engaged in other occupations incident to this industry.

In dealing with the problem of the safety of linemen, it is very important that we do not forget that at least 85 per cent of the accidents to this class of employes is due to the human element and about 15 per cent to mechanical or physical conditions of the property. Consideration of this ratio is fundamentally necessary in any intelligent plan for their protection. A careful analysis and the study of this failure of the human element develops that chief among the contributing causes for man-failure are physical or mental unfitness for the work, lack of definite rules, dangerous practices and misunderstanding of orders.

During the year 1914, the Public Service Company of Northern Illinois, a company operating both gas and electrical properties largely within the interurban district adjacent to Chicago and operating about 800 miles of transmission lines serving, approximately 180 communities, had a record of 9 accidents of over 30 days' disability, 8 of which were in the line department.

The Middle West Utilities Company operates public service properties in the smaller communities of several states. An analysis of the fatal accidents to employes reported by the subsidiaries of this company for the years 1913 and 1914 and up to October 15, 1915, shows a total number of 14 fatal accidents to employes of which 10 occurred to linemen. Of the total amount of money expended on account of these fatal accidents to employes, three-fourths was expended on account of the fatal accidents to linemen.

From these facts we fully conclude that the safety of the lineman is a most important factor in the accident prevention problem of these industries.

1. *Selection*—Frequently, sufficient attention is not given to the selection of linemen. Especially is this true where extensive construction work is about to begin, when the man who happens along and declares himself to be a lineman is given employment and no effort is made to ascertain his fitness to perform the work with safety to himself and others.

2. *Rules and Practices*—Many companies have certain definite rules and practices which are to be followed. Frequently, newly employed men and sometimes men who have been employed for some time have ideas of their own which do not conform to the rules which the company has found by experience to be necessary. A certain discipline should control these conditions. A careful study of the practices of men should be made by the foreman and any hazardous practices corrected.

3. *Proper Guards and Protective Equipment*—Rubber gloves, line shields and other approved protective devices should be furnished by the companies. In order to insure the use of protective equipment provided, there must be complete co-operation between the linemen and the foremen. Such co-operation can best be secured by interesting both foremen and linemen in accident prevention work. It cannot be maintained by occasional and spasmodic efforts, but the foremen and linemen must be impressed with the fact that accident prevention is an important part of their everyday work.

4. *Allow Sufficient Time for Performance of Work*—In many instances sufficient time is not allowed for the work to be done. In such cases the workmen are hurrying to finish the work and the foreman is also hurrying the men to complete the job in the time given and the men do not take time to provide proper protection.

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Standardization of Systems of Medical Supervision

By Dr. J. W. Schereschewsky

U. S. Public Health Service, Pittsburgh, Pa.

Proceedings of the Fourth Annual Safety Congress, National Safety Council.

IT is plain that the benefit to be derived from systems of medical supervision of workers is becoming generally recognized; yet the whole subject, at present, is in a state of flux. Different ideals exist of the functions of medical supervision, its place in the industrial world, the ends it may be made to subserve. We are now in its formative period. The useful evolution of the future depends largely upon our treatment of this subject in the present.

All who have studied or have had practical experience in this subject are unanimous in the belief that medical supervision is a good thing; all who are interested in medical supervision would like to see the idea become universal in practice.

The fundamental purpose of medical supervision is to prevent the transmission of disease, needless physical deterioration, the safeguarding of the worker from preventable industrial hazards, the continuous maintenance of health as well as from an accident standpoint. Prevention is therefore the keynote of the system. But because medical relief is often itself of a preventive character, such relief must also be provided for in systems of medical supervision.

In addition to the above, provision must be made for the systematic recording of the valuable data which result from such systems, so that their study will yield the indispensable information as to benefits derived, the cost, the prevalence of defects and diseases among groups of workers, the direction in which hygienic improvements should be effected and the suppression of activities which are superfluous or ineffective.

There is need, therefore, for standards in the following particulars, which fall naturally into two general classes, to wit: (a) Standards of personnel and equipment, and (b) Standards of practice. Under the first head we must consider the employment of whole time or part time plant physicians, the number which should be employed for a given factory personnel, the aids, in the form of clerical, nursing and other assistants, which should properly be supplied the plant physician, the function of such assistants, the floor space required, the construction and equipment of relief department, and similar questions.

Under the second heading we must put:

(1) Standards of physical examination.
(2) Standards with respect to rejections.
(3) Standards in regard to physical defects and diseases not implying rejection, including the provisions for those physically sub-standard.
(4) Standards of practice in regard to injuries.
(5) Standards for the treatment of cases requiring medical relief.
(6) Standards for the sanitation of industrial plants.
(7) Standards for efforts at health education of the plant personnel.
(8) Systems of recording and compiling records.

It is evident from the foregoing that this question is highly complex. There is so much that might be done, yet we are hampered at every hand by cost considerations, misapprehensions of the benefit incurred and many other discouraging features. Nevertheless, it is important, if medical supervision is to fulfill its predestined function, to measure up to the constructive ideals it stands for, that all the standards enumerated above must be considered in their turn and due provision be made for their adoption. Sickness insurance, as practiced in some European countries, aids to simplify the problem.

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EDITORIAL

Underwriters' Laboratories Wins Case

THE National Bureau of Standards has rendered a decision in favor of the Underwriters' Laboratories in a case brought by a manufacturing company against the Laboratories. This is the first case that has come before the Federal authorities since arrangements were made, several years ago, for decisions on technical matters concerning which fixed differences of opinion existed between the Laboratories and its clients. In the case just decided, experts of the Bureau of Standards conducted exhaustive tests in Washington, Boston and Chicago and investigated service installations of the device under investigation in New York, New Haven, Philadelphia, Baltimore, Pittsburgh, Cincinnati, Cleveland and other cities.

Safety Movement in the United States

ADDRESSING the American Society of Mechanical Engineers, the secretary of the National Safety Council, Mr. W. H. Cameron, reviewed the attitude of the employer toward accident prevention and workmen's compensation. About twelve years ago, he said, the United States began to realize that preventable industrial accidents were a national evil of appalling magnitude. It was shown that the number of accidents and the economic losses occasioned by them were increasing in higher ratio than the output of the industries. When the extent of the evil became fully apparent, the safety campaign began. Prior to that time, it was commonly assumed that the increase in industrial accidents was inevitable, caused by the growing use of power-driven machinery. This view has been shown to be far from the truth, because the majority of industrial accidents are not caused by machinery, but by carelessness in its use—a carelessness that is largely preventable by educational methods. The first step in accident prevention was to disprove the doctrine that accidents are necessary. There is still an ultra-conservative type of employer who is not yet awake to modern methods of safety and efficiency. Another class (in which many owners of small plants are included) takes a moderate interest in the safeguarding of machinery—if it does not cost too much money. A third group may be termed the progressive group—the pioneers in the accident prevention movement, the large employers of labor, the leaders in industrial life. This class of employers asks safety engineers to review plans for new shop buildings from the standpoint of safety and comfortable working conditions. One employer of this type said that his investment for safety had brought a tangible return of 80 per cent.

Summarizing the progress in safety work in recent years, Mr. Cameron said that from the anciently accepted attitude of indifferent or ignorant acquiescence in accidents has come an awakening, caused by publicity, that has compelled a realization of the inhumanity and fearful economic waste of accidents. There has been a discovery and a growing conviction that accidents are preventable. The employer has proceeded to prevent accidents, impelled by humanitarian impulses and spurred by compensation laws that put the burden and responsibility on the industry and the employer, sweeping away the old outgrown customs and laws. The result has been a great and gratifying reduction of accidents through mechanical safeguarding and the education of workmen; the discovery that good safety work has been a big money saver over the old accident conditions; the discovery of the constructive value of safety work, which has proved a great aid to industrial efficiency and economy; the bringing of employer and employe together on a common ground of mutual interest, thus producing a fellowship, a good feeling and a co-operation that nothing else could have accomplished.

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Standardization Of Safety Principles

By Carl M. Hansen

Member of American Society of Mechanical Engineers

Proceedings of American Society of Mechanical Engineers, Annual Meeting, December, 1915.

DURING the last half of the nineteenth century, a complete revolution took place in the industries of the world and particularly of the United States. Efforts of engineers in all lines of production were concentrated on the one single problem — efficiency.

2. With the dawning of the twentieth century, it was seen that we had achieved an efficiency in our industries surpassing that in all other countries. The machine tools of the United States, for instance, were recognized as superior to any manufactured elsewhere. Through the clogging of our courts with litigation involving injuries to operators of these machines, however, we began to ask ourselves if in our zeal for productive efficiency of machines we had not overlooked one vital factor. Were these machines reasonably safe for those workers who had to give them constant or intermittent attention?

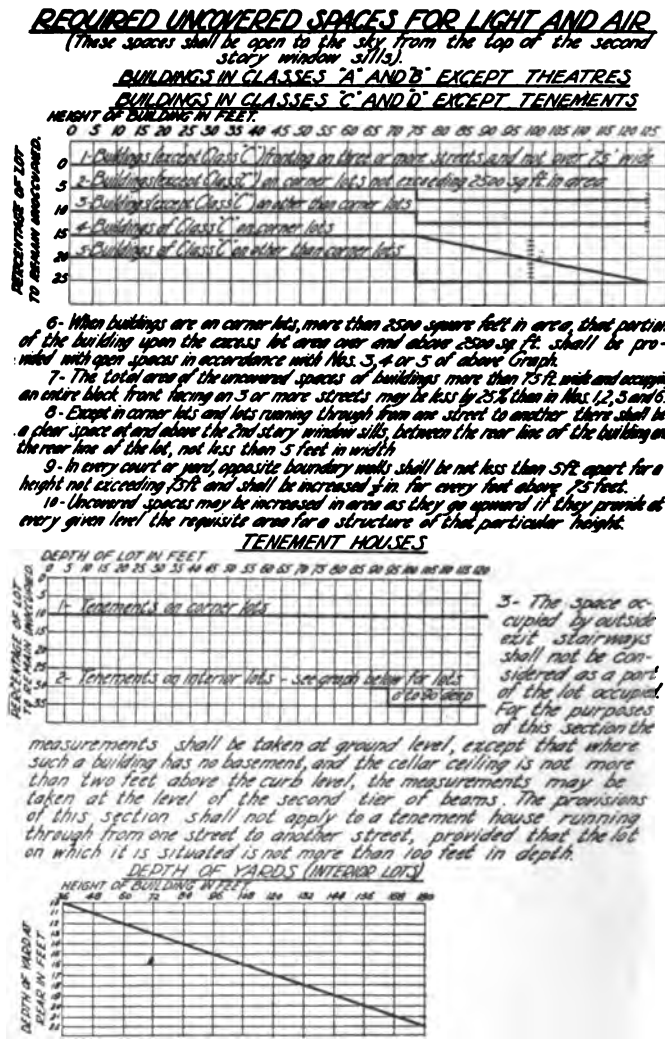
REQUIRED UNCOVERED SPACES FOR LIGHT AND AIR
(These spaces shall be open to the sky from the top of the second story window sill.)
BUILDINGS IN CLASSES "A" AND "B" EXCEPT THEATRES
BUILDINGS IN CLASSES "C" AND "D" EXCEPT TENEMENTS
HEIGHT OF BUILDING IN FEET.
PERCENTAGE OF LOT TO BE KEPT UNOCCUPIED.
1-Buildings (except Class "C") fronting on three or more streets and not over 75' wide
2-Buildings (except Class "C") on corner lots not exceeding 2500 sq ft. in area
3-Buildings (except Class "C") on other than corner lots
4-Buildings of Class "C" on corner lots
5-Buildings of Class "C" on other than corner lots
6- When buildings are on corner lots, more than 2500 square feet in area, that portion of the building upon the excess lot area over and above 2500 sq ft. shall be provided with open spaces in accordance with Nos. 3, 4 or 5 of above Graph.
7- The total area of the uncovered spaces of buildings more than 75 ft. wide and occupying an entire block front facing on 3 or more streets may be less by 25% than in Nos. 1, 2, 5 and 6.
8- Except in corner lots and lots running through from one street to another there shall be a clear space at and above the 2nd story window sills, between the rear line of the building and the rear line of the lot, not less than 5 feet in width
9- In every court or yard, opposite boundary walls shall be not less than 5 ft. apart for a height not exceeding 75 ft. and shall be increased 1 in. for every foot above 75 feet.
10- Uncovered spaces may be increased in area as they go upward if they provide at every given level the requisite area for a structure of that particular height.
TENEMENT HOUSES
DEPTH OF LOT IN FEET
PERCENTAGE OF LOT TO BE KEPT UNOCCUPIED
1- Tenements on corner lots
2- Tenements on interior lots - See graph below for lots of greater depth
3- The space occupied by outside exit stairways shall not be considered as a part of the lot occupied. For the purposes of this section the measurements shall be taken at ground level, except that where such a building has no basement, and the cellar ceiling is not more than two feet above the curb level, the measurements may be taken at the level of the second tier of beams. The provisions of this section shall not apply to a tenement house running through from one street to another street, provided that the lot on which it is situated is not more than 100 feet in depth.
DEPTH OF YARDS (INTERIOR LOTS)
HEIGHT OF BUILDING IN FEET
DEPTH OF YARD AT ROOF IN FEET

Fig. 1. Safe Areas of Buildings on City Lots

3. With an annual toll of upward of 50,000 workers killed and approximately 2,000,000 other more or less serious, but non-fatal accidents, we realized that we were rapidly on the road to creating a nation of cripples, and that in order to measure true efficiency in our industries it would be necessary to take into account the economic loss occasioned by all these work accidents. In taking stock to that end we found

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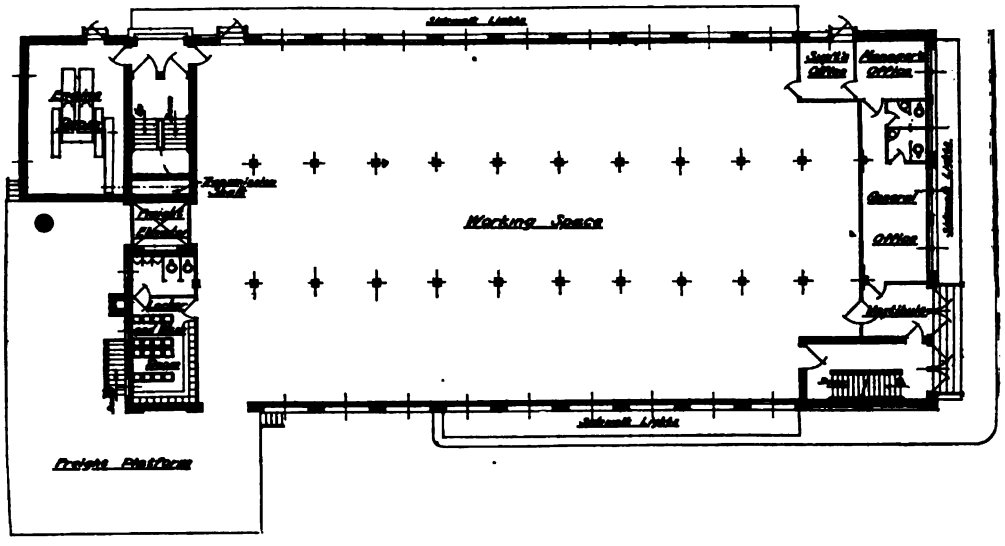

Fig. 2. Factory Building Mill Construction. First Floor Plan

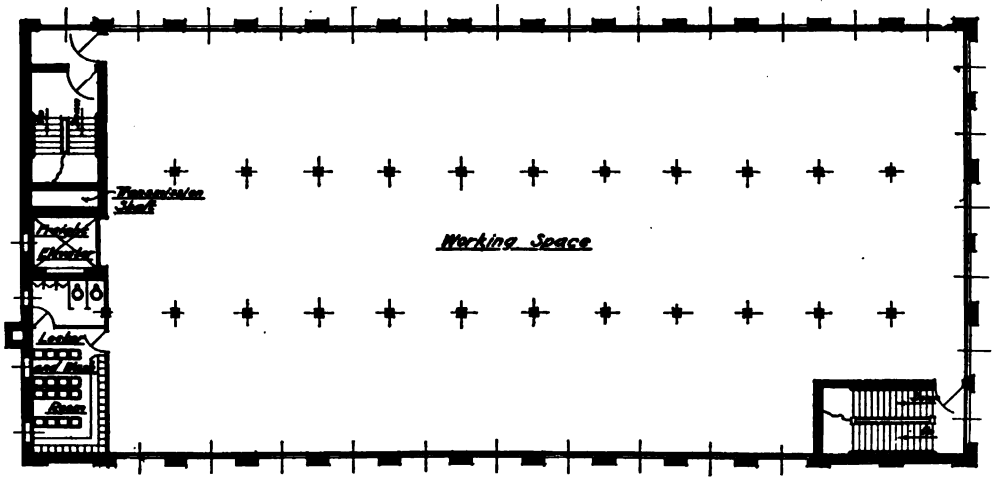

Fig. 3. Factory Building Mill Construction. Typical Floor Plan

that an amount of between five and $600,000,000 had to be added to our cost of production in order to collate an exhibit of our true efficiency.

4. Some of our larger corporations, particularly the United States Steel Corporation, the International Harvester Company and several others, at the same time, and even earlier began to study the subject and someone—who it was has never yet been finally decided—coined the happy expression

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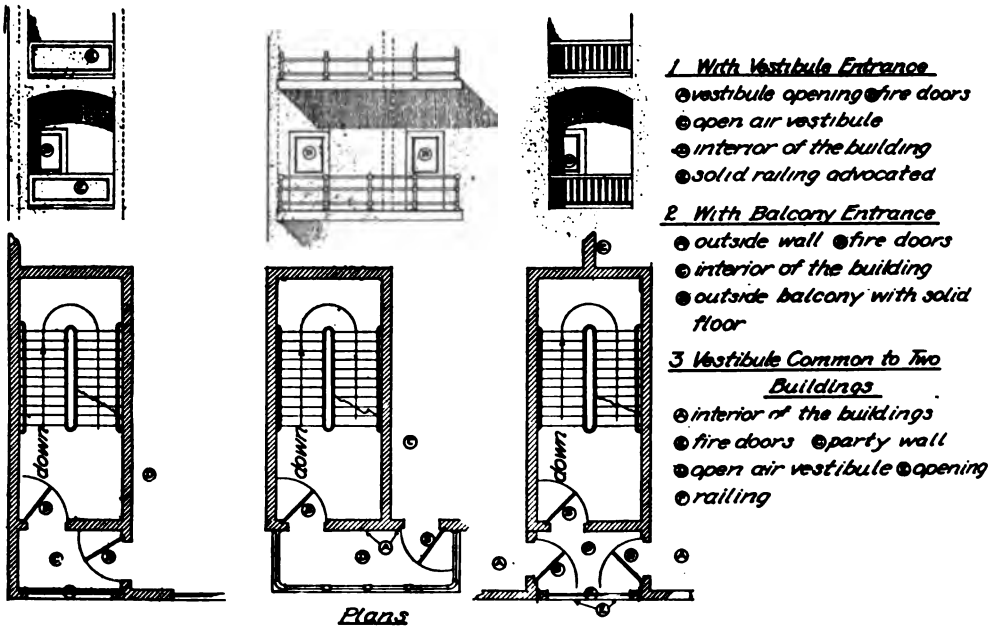
1 With Vestibule Entrance
A vestibule opening B fire doors
C open air vestibule
D interior of the building
E solid railing advocated
2 With Balcony Entrance
A outside wall B fire doors
C interior of the building
D outside balcony with solid floor
3 Vestibule Common to Two Buildings
A interior of the buildings
B fire doors C party wall
D open air vestibule E opening
F railing
down
down
down
Plans

Fig. 4. Smoke Proof Towers

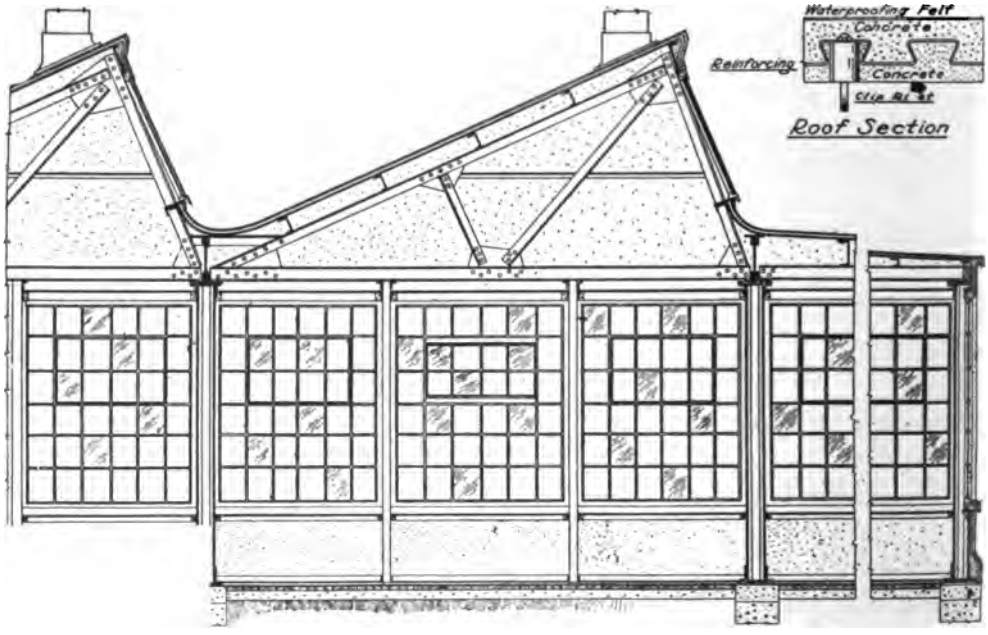

Fig. 5. Saw Tooth Factory Construction

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"Safety First." It was recognized that compensation for injuries was a just and equitable plan, generally in the interest of society at large, but that if we could prevent the injuries from happening we should eliminate not alone a tremendous amount of human suffering and hardship, but we should make one of our greatest forward steps in economic efficiency. The whole movement was characterized by duplication of action and resulting inefficiency, until at last in the fall of 1912 the National Safety Council was formed in the City of Milwaukee for the purpose of bringing to some extent harmony out of the existing conflict of opinions. This organization, now embracing a membership of many of the most progressive corporations and individuals in every state of the Union, has done splendid work. It has been a powerful factor in arousing public opinion to the subject and in bringing it to the stage where the engineering profession as such must take due cognizance of it and do their share in bringing about universal safety.

5. It is through standardization that engineers must play their most important role and in the standardization of safety principles there are the five requirements, to put the matter tersely. that these principles must be high, comprehensive, practical, simple and positive.

6. By high standards is meant those which afford all possible safety to life, limb and property from accident and fire hazards; that a building or a piece of equipment is safe enough only when it is as safe as it can possibly be made or only when it is as safe as any other building or piece of equipment designed to perform the same function.

7. By comprehensive standards, is meant those which embody not alone the equipment in a building, but the building itself as well, and not only a plant in New York, but rather any plant regardless of location.

8. By practical, is meant those which do not destroy or distort either the convenience or efficiency of the equipment to which they are applied.

9. By simple, is meant that they be so prepared that they will be readily understood and applied by the ordinary mechanic, that the safest way will always be the easiest way.

10. By positive standards is understood to be meant that they will eliminate the hazard for which they were designed; that is, that they will do something, or cause something to be done, or absolutely prevent something from being done, rather than simply serving as a suggestion. That, in other words, they can be depended upon for unfailing action with as little consideration as possible for the universally uncertain human factors, such as knowledge, memory and involuntary acts, etc.

11. In the following an attempt will be made to illustrate these principles in actual application. Commencing with a typical factory building, the supposition is that the site has been selected and that the problem is to design and equip the building for maximum safety without interfering with efficiency or convenience.

12. An isolated factory presents few difficulties, but the city factory offers problems in planning, due to the proximity of other buildings, which must be regulated by standards. It has been determined that a certain percentage of the lot must remain uncovered in order to provide sufficient air and light. What that area of unoccupied space should be, given the size of the lot, is indicated in tables in Fig. 1. This illustration shows the percentage of area which can safely be occupied with any class of building on any type of a city lot.

13. Having determined the outline of the plan, the next step is to determine means of rapid and safe egress which at the same time will not interfere with the efficiency of the manufacturing processes and are based on total occupancy of building. Figs. 2, 3 and 4 show suggested arrangements of such a plan by means of stairs enclosed in fire resisting walls and smoke proof towers.

14. As will be noted, the power plant and the vertical transmission shafts are separated from the rest of the build-

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ing to prevent the spread of fire, and the elevator shafts are inclosed in fire resisting walls and equipped with automatic fire doors.

15. The windows exposed to fire hazard from other buildings are glazed with wire glass set in metal sash. All lintels are far enough below the ceiling so that the heated gases will be contained to operate automatic extinguishers and so that flames breaking out through the window are diverted from the other wall openings.

16. Even allowing for this and for the minimum width of piers, ample lighting facilities are obtained. Space is provided for toilets and wash rooms having outside light and ventilation and with a sufficient number of wash basins and other toilet facilities to accommodate the employes.

17. The construction should be fire resisting to a high degree, as illustrated in Fig. 5, but in case this should prove too expensive, owing to location or other circumstances, a good type of slow-burning construction as indicated in Fig. 6 may safely be adopted. Whether it be fireproof or slow-burning mill construction, fire fighting equipment should be provided, such as automatic sprinklers, wall and yard hose and portable extinguishers, etc.

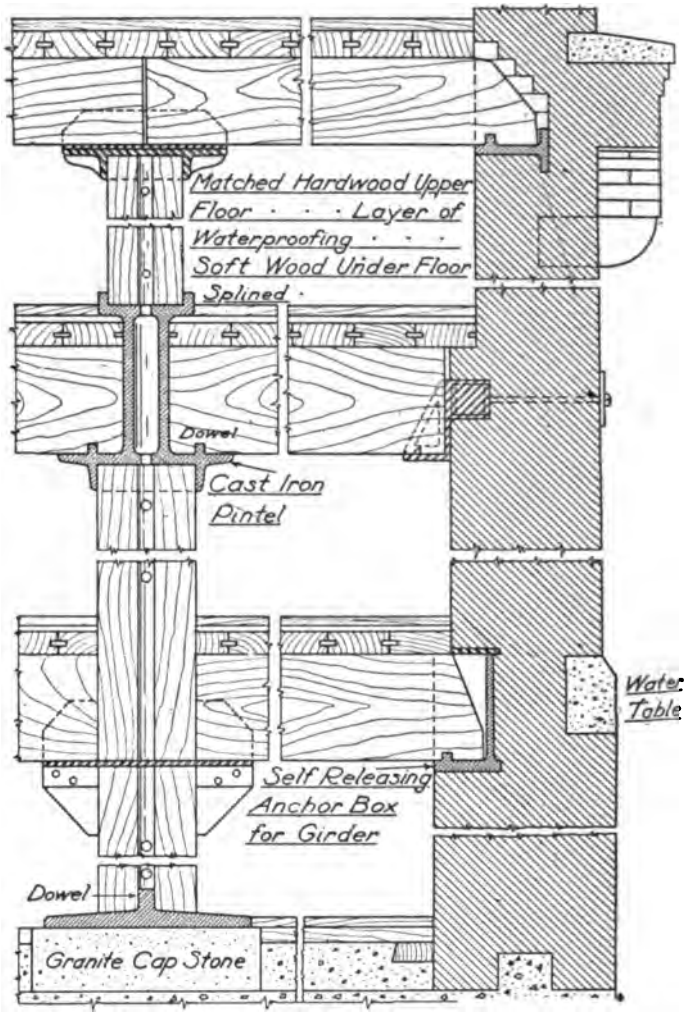

Fig. 6. Details of Mill Construction

18. It is admitted that no specific standard can be laid down which will embody specifications covering any or all of the foregoing. All that the author is endeavoring to show in these illustrations is the principle which must be applied to the particular problem confronting the architect or engineer in designing a building and he desires to emphasize the fundamental fact that these principles are essential.

19. It may be maintained that all these factors are having careful attention at this moment and are being embodied in modern structures. It is admitted that such is the case in individual instances, but as a general rule—No! Facts are against such a contention. Very few factory and even few office buildings which have been designed and built in this country in

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the last few years are truly safe for the occupants. It is not asserted that they fail to comply with existing codes, laws and regulations, but as long as each individual city has its own building code, often based upon the particular market of its locality and dominated by the building products of the controlling political parties, is it not too much to assume that scientific results will be obtained?

20. As practical men, however, it would be impossible to condemn all buildings now in existence which do not embody the ideal safety principle. Our plan must therefore include existing buildings as well.

21. Taking the building, for example, where adequate means of egress have not been provided, it may be necessary to overcome this deficiency by means of outside exit stairways of a type shown in Fig. 7, but under no circumstances should the so-called "fire escapes" as commonly known be countenanced, that is, exits with such objectionable features as gridiron balconies connected by open stairs or ladders, or exits so located that they adjoin windows.

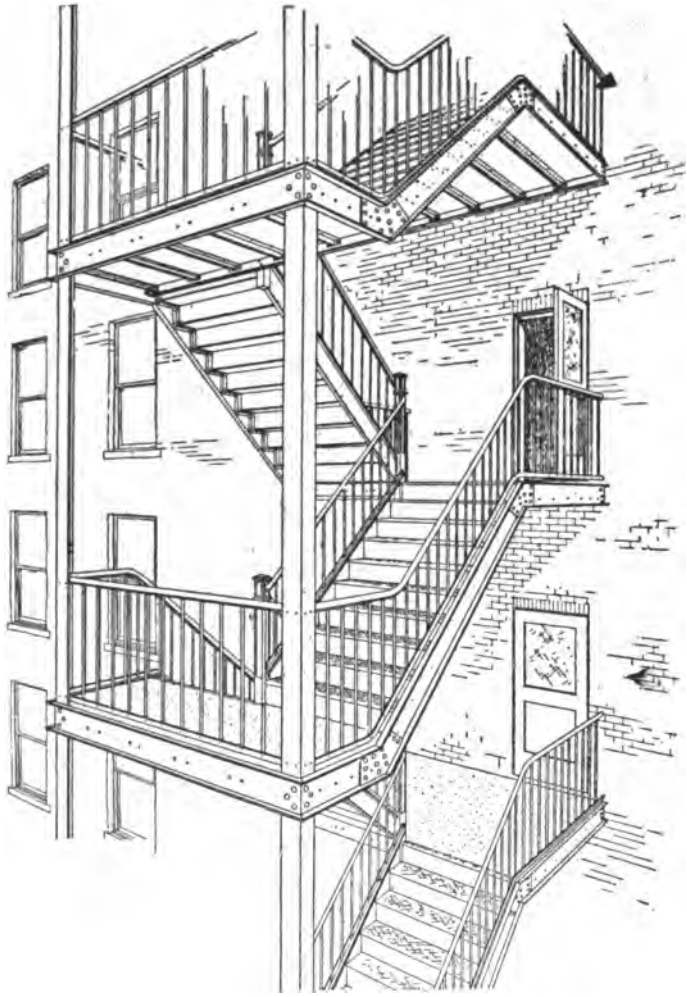

Fig. 7. Approved Type of Outside Exit Stairway. Stairs Perpendicular to Wall

22. The horizontal exit obtained by means of bridges connecting adjoining buildings, or in the case of large floor areas the breaking up of the area with fire resisting partitions and automatic fire doors, are very effective means for promoting safety from the fire hazard in many existing buildings and it is quite incomprehensible why those plans are not more extensively used. This method places safety zones immediately next to the danger zones.

23. It is naturally impossible in a paper of this nature to go largely into details. There are many more questions which properly should be considered in connection with buildings, but it is hoped the foregoing will illustrate the points involved.

24. We next come to the selection and installation of machinery and equipment generally. Where machine tools are to be used, only those should be specified which have all possible safeguards embodied in original design; that is, as an integral part of the

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machine itself. A safeguard on a machine should not be an extra attachment or an afterthought; it should be as much an original part of that machine as are the gears or the pulleys. A manufacturer of machine tools should consider it an insult to have a purchaser of his product add parts to it after it has been installed.

25. Gears are necessary on certain classes of machines for the transmission of power, but no engineer will admit that these gears have to run openly in order to perform their function. Knowing that as long as they run openly they present a hazard, and knowing further that it is an unnecessary hazard and that it will not reduce the efficiency of the machine to eliminate it, it must appeal as a logical proposition that such elimination should be effected in original design rather than after the machine has been installed. This applies equally to all other points creating an accident hazard.

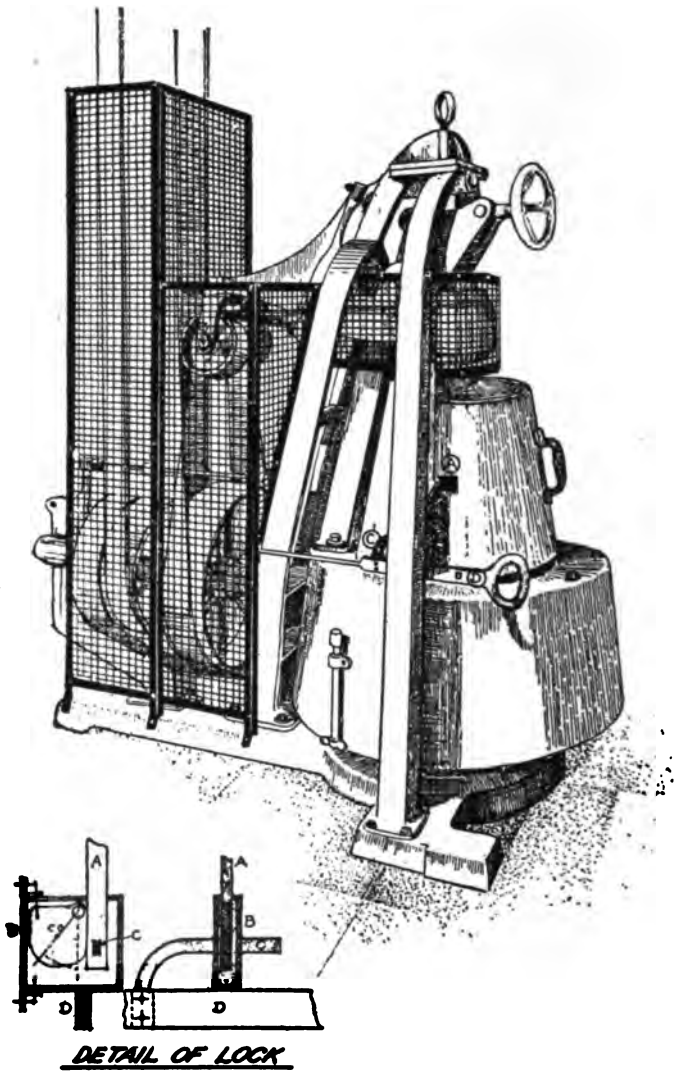

Fig. 8. Door-Lock on Over-Driven Extractor

26. In order to meet the principle of safety a guard for a machine should be so constructed as to prevent the removal or misuse of its essential parts. Wherever possible, it should be so designed in relation to the machine to which it is applied that the machine cannot be operated unless the safeguard is in position. This may seem to present insuperable difficulties in the design of certain types of machines. It has been the author's experience, however, that where concentrated study has been given to that particular principle in machine design, it has been met in every instance. Fig. 8 indicates the principle applied in the door-lock on a laundry extractor. As formerly stated, it is the human element which must be overcome in the application of safeguards. It is often noted in advertisements of certain guards that arguments are used such as: "Can easily be removed;" "Can be thrown out of the way at will;" and so forth. The real arguments for superiority of safeguards should be: "Cannot be removed;" "Can only be removed or ad-

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justed by key;" "Is necessary for the operation of the machine;" etc. This principle is again illustrated in Fig. 9.

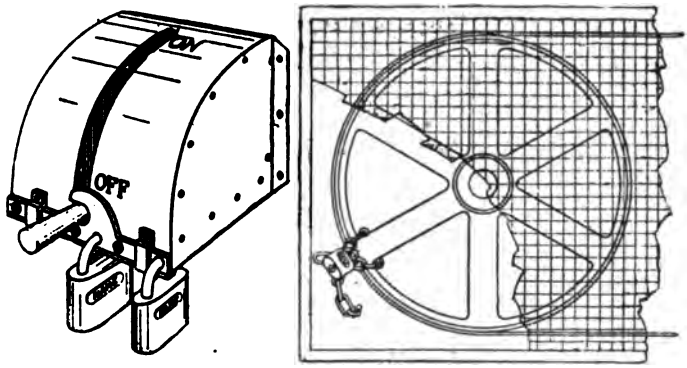

Fig. 9. Two Examples of Padlocks as Safeguards

27. A further study of the question of safeguarding has brought out the fact that the application of a safety principle often increases the efficiency, as, for instance, in the case of stamping presses equipped with slide and gravity feeds, as shown in Fig. 10. It is a fact well established in stamping press operations that that method of feed naturally increases the output on the machines where applied and often produces that result. It must be noted, however, that the automatic feed as such does not in itself form a complete guarding of that press. Some further protection must be provided, making it impossible for the attendant to put his or her hands in the actual danger zone during the downward stroke of the ram.

28. If from a construction standpoint the building is properly provided with all safety features, and the machinery and equipment with its belts, pulleys, gears, set-screws, couplings, etc., embody all safety principles, there are still other hazards which must be carefully considered and the principle for elimination of these hazards established. The slipping hazard is one of the most important. A careful study of many accidents as reported has brought out the fact that slippery surfaces constitute one of our largest contributory causes to such accidents. That the slipping hazard is easily and can be practically eliminated by the introduction of anti-slip surfaces on all stairs and on all floor surfaces where employes or other occupants of buildings frequent is an established fact. It is particularly necessary that such anti-slip surfaces be used around machinery.

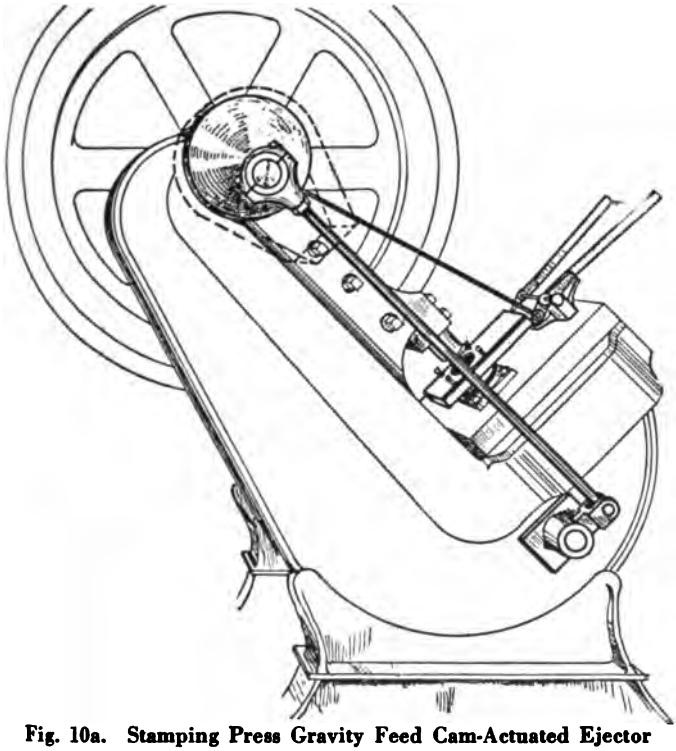

Fig. 10a. Stamping Press Gravity Feed Cam-Actuated Ejector

29. Poor light is also a potent contributory cause to accidents. It must be admitted, however that more has

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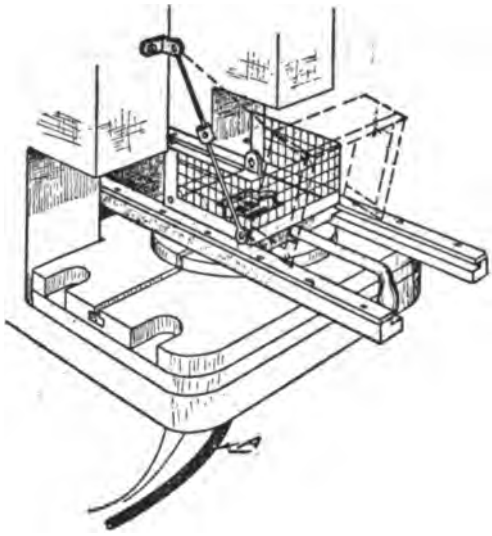

Fig. 10b. Stamping Press Slide Feed Air Ejector. A=Air Ejector Hose

been done in this particular phase of hazard elimination than in any other, thanks to our exceedingly efficient illuminating engineers.

30. Having proven, so the author hopes, the necessity of safety as an essential principle in the design of buildings and their equipment; having further proven the practicability of such safety principles; and having reinforced this by showing the apparent need of standardization in the premises, the question is before us of where and how shall we obtain such standards? The answer lies in another question: Where did we get our industries? Who is responsible for the hazards in these industries? We—the engineers. We have created the machines used and it is up to us to eliminate any unnecessary hazard which these machines have introduced.

31. The unfortunate phase of the whole subject is that up to now safety has been dealt with as a legal subject. We have left it to our courts, to our lawyers, to decide whether or not a building or a machine was safe for its occupants or operators. Now, the author maintains that safety never was and never should have been made a legal question. It is not a question of law; it is in every instance a question of fact and who is more competent to deal with questions of fact than engineers, especially when these facts pertain to their own business?

32. To give a typical illustration of legal and engineering standards: The hazard of moving elevators and open shaft doors has long been recognized through occurrence of hundreds of fatal and serious non-fatal accidents. Legislators in different municipalities and States have passed statutes to the effect that it shall be deemed unlawful for an elevator operator to start his car until the doors of the shaft are closed and latched. This is a typical standard produced by legislators. But does this prevent the occurrence of elevator accidents from open doors? It does not, because it is impossible to enforce the act in time to prevent the accident. The only thing that such a statute accomplishes is to establish responsibility for the accident after it has occurred.

33. Let us consider briefly how an engineer would solve the same problem. He would analyze the mechanism of the elevator, the door and the motive power. He would find the contributing causes which produced the hazard and re-design his elevators so that it would become impossible for the operator to reproduce the dangerous conditions, and would compel him to perform a certain act before he could get motive power—the act in this case consisting in closing the door, in order to move his operating lever. A device to illustrate this point is indicated in Fig. 11.

34. When engineers have developed such a principle and shown it to be a practical one, our legislators may well assist them in giving legal force to it, but this should be done without any unnecessary phraseology. To write a law book on a question of fact which can be expressed in a line is folly.

35. Before closing, it is desired to express a further word in respect to building design. Our architects may well say this is an architectural problem and one which should be left to them to deal with and solve. Let it be clearly understood there is no de-

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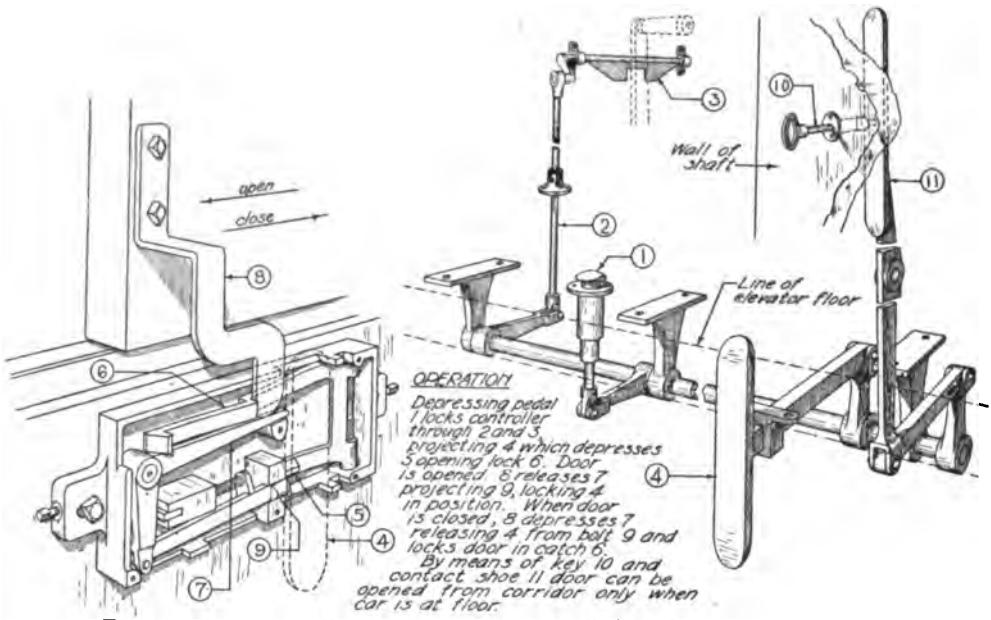
open
close
Wall of shaft
Line of elevator floor
OPERATION
Depressing pedal 1 locks controller through 2 and 3, projecting 4 which depresses 5 opening lock 6. Door is opened. 6 releases 7 projecting 9, locking 4 in position. When door is closed, 8 depresses 7 releasing 4 from bolt 9 and locks door in catch 6. By means of key 10 and contact shoe 11 door can be opened from corridor only when car is at floor.

Fig. 11. Automatic Elevator Door and Controlled Lock with Foot Release

sire upon the part of the author to dictate what is and what is not proper building design. Let it further be understood that there is no intention to advocate that our architects should sacrifice art, utility or any other desirable feature of building construction in the interest of safety. But it is maintained,—and this with a fair degree of conviction,—that the architect of the future must combine safety, convenience, efficiency and art in order properly to serve the interests of society, with always,—as in the case of the engineer,—"Safety First."

36. Let it be further understood on the part of the author's brother engineers that no attempt is made or will be made on the part of the organization which he represents, namely, the Workmen's Compensation Service Bureau, to enter into specification details in any standards which that organization may be responsible for. In fact, the term "standard" as used under the auspices of that organization refers solely to standardization of principles, leaving it then to the engineers of the various industries to apply these principles in their particular field, a task for which they are far better qualified than any one else.

37. The Workmen's Compensation Service Bureau, however, has a vital economic interest in the premises. It is an organization composed of the leading liability insurance companies on this continent. It deals with the matter in a concrete sense in-so-far as its constituent company members insure the liability occasioned by any hazard present in buildings and equipment. To value these hazards properly and to eliminate them, as well as to avoid discrimination, specific standardization is essential. We have undertaken it in the interest of our own business, but the interest is equally as great on the part of the industries insured because the rates for insurance are in direct ratio to the presence or absence of any hazard.

38. In conclusion, the author believes it a self-evident fact that the engineers as creators of our industries owe it as a duty to these industries and the nation of which they form so important a part to exert their utmost efforts in the conservation of life and property which are so essential to the economy of the individual plant and so essential to the nation as a whole. The subject should be treated with the consideration that it justly deserves.

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"The Man on the Job"

Prevention of Accidents By Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize of $10.00 *and one Second Prize of* $5.00 *for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 201 COST OF SAFETY APPLIANCES.—It has been my experience, while talking safety appliances, to hear wide complaints of the excessive price placed by inventors of safeguards on their products. I believe it is an inspector's duty to try to reduce the cost of safeguarding as much as possible. I consider this a work of humanity and while I believe everyone should receive just prices for his output and labors, I think no safeguard should be withheld from the public by reason of its prohibitive cost.

Herewith is recommended a shaft guard (Fig. 1) made of a quarter-inch mesh tacked on to a furring strip frame, hung by hooks in front of the low shafting for sewing machines. The pulley is to be guarded by usual types of guards now used.

This guard prevents hair and clothing from winding around the shafting. It also has a great commercial value as the manufacturer often loses an entire ream of silk, or linen cloth, by having it wind around the shafting. It is impossible for this to happen with the shafting enclosed. It also keeps the dirt out and makes sweeping a delight, instead

Fig. 2

Fig. 1

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of a task and hazard where a short brush has been used.

The second cut (Fig. 2) shows a guard for old style square-heads for jointer and planer. These guards can be attached to the old head and the same knives may be used.

❦ ❦ ❦

No. 202 GOOD AND BAD MACHINE GUARDS. — One feature of safeguarding that can never be discussed too often is the right and wrong ways of making guards. Since the schedule rating went into effect manufacturers show clearly their eagerness to safeguard machinery in order to reduce their rates, but unfortunately they often think anything good enough so long as the machines are so-called "guarded." They do not seem to give a thought as to what might happen if, for instance, a belt should break while a man was near the belt when the accident occurred. Nor do they take into consideration the fact that, at some time or other, all machines need overhauling, and find, when this becomes necessary, that the entire guard must be removed or destroyed in order to get at the machine.

How long a manufacturer could exist in business if he made his products with the same ingenuity that he does his guards, or if his machines were designed with the same disregard of accessibility to the main moving parts as some of his guards are made, can be left to the opinion of the reader.

A guard, just the same as a machine, must be made right. It probably costs a little more to make the guard at the time of installation both durable and practical, but it is certainly cheaper in the long run.

In designing a guard, three items should be considered: Practicability, accessibility and durability.

Some guards, particularly belt guards, are so constructed that they prove a greater hazard to the operator than if there were no guard at all, especially when trying to put on a belt. Can you blame the operator for considering safeguarding a nuisance if he is under a greater hazard with the guard than he would be without it?

A well-designed practical guard is always welcomed by the workman for he feels that it gives him greater security which increases his output. Thus both employer and employe are benefited thereby.

Some workmen are naturally opposed to safeguards, no matter how well made, but these are in the minority, and with a little patience even this class can usually be converted to the good cause.

If the employer or superintendent goes through the plant and finds a guard not in use, he can almost always be certain that something is wrong with it. Probably it is impractical and interferes with the workman's production. But whatever the cause, if the chief will enter into conversation with the employe and listen to his views, together they will nearly always be able to remedy the defects and create a practical and efficient guard. This familiarity is not always in evidence however, chiefly because safeguarding is considered an insignificant item and too often orders are issued to the carpenter or "all-around handy man" to "get a little lumber and fix it up as cheaply as possible." What is the result? An inefficient and impractical safeguard.

Of course there are always exceptions where safeguards are properly made, but there are also innumerable plants where a little more attention to this matter is sadly needed.

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No. 203 REALIZING THE HIGHEST IDEALS FROM "SAFETY FIRST." —It is a noble task to teach others the importance of self- preservation. This, commonly spoken of today as "Safety First," should be the underlying desire and earnest effort of every employer and every employe in all industrial organizations. This idea, so lately come to be looked upon as of the utmost importance to all humankind, has grown within the past few years until it ranks with the other factors of progress, such as efficiency, cost reduction, time and labor saving and progress. In a word, it must take precedence over all these things, as

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upon its foundation we build the superstructure of real achievement.

Every progressive industrial organization today has its safety plans well under way. Every thoughtful and considerate business has its department well in hand for the uplift of its employes, looking toward the realization of the plan whereby workers will be enabled to profit by the errors of the past, and prevent the accidents that are still one of the appalling conditions devastating our industrial ranks year after year. A step forward in this direction will do more to bring about real progress than many other things that have for the most part been looked upon as of much greater necessity. Without capable men and women we shall gain small headway, and the most capable employe is the man or woman who will view the matter of self-preservation as of the highest value individually, as well as that of his fellow workers.

This idea was the underlying cause which hastened the formation of the safety organization established some months ago by the Commonwealth Edison Company, of Chicago, and which has placed it on a basis making possible real achievement within the short space of time that it has been conducted, more especially along its more advanced lines of endeavor. Efforts had been made to reduce the number of accidents and to make possible such provision as would eliminate them where possible, without any specific organized plan, but the results were far from being entirely satisfactory. The number of accidents, most of them easily preventable, was too great to permit of recurrence, and the fatal accidents more numerous than was deemed necessary even in this large organization, where the hazards are necessarily great. The subject was taken up in various ways, and the conclusion was that a reduction, if not an entire elimination of the accidents, was possible, because they were directly due to the thoughtlessness of the workers, and to a certain disregard on the part of others, to consider the aftermath of their heedlessness.

How to overcome this condition and how to show the worker the folly of thoughtlessness demanded a thorough study of the important topic of accident prevention. To make this effective demanded that more than a superficial effort be undertaken. A haphazard effort would be little better than nothing, and without the cooperation of the entire force there would be small returns made for the energy put forth. There must be an organized crusade, and a united effort in order that the ends sought might be realized.

An industrial organization with 4,000 employes, covering a widely diffused number of occupations, and scattered over a considerable area of territory, demanded a careful insight, and a combined organization of the employes that would prove effective. So in order to seek the realization of this goal it was determined to form an organization, including every employe in the several departments where hazardous labor was part of the duties, who could co-operate with each other to bring this condition about at the earliest possible time. This co-operative movement was to be known as the

COMMONWEALTH EDISON COMPANY SAFETY ORGANIZATION.

The purpose of the organization is to prevent accidents by securing the co-operation of the employes of the company, by affording them an opportunity for the discussion of safety work, and by organizing, instructing and interesting them in methods of performing their work with the greatest safety to the public and to themselves.

The safety organization consists of: (a) the Central Committee on Safety; (b) Intermediate Safety Committee; (c) Employes' Safety organizations.

The president of the company on December 8, 1913, appointed a Central Committee on Safety, consisting originally of six officials and heads of departments and four members who are elected by employes. This central committee has a chairman, vice-chairman and secretary; the latter also be-

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ing inspector of safety, and in immediate charge of all of the safety work of the company. He is also chairman of all intermediate committees, consisting primarily of all the division heads and foremen. All other employes are organized into convenient employes' organizations, and elect their own officers and forward their recommendations to the intermediate committees.

This entire safety organization is selected to work within the departmental organization of the company, and affords employes the opportunity to make suggestions and recommendations.

Each employe attends at least one safety meeting every 90 days of the employes' organization of which he is a member. The intermediate committees meet at least once every 60 days, and the central committee on safety at least once every 30 days.

The inspector of safety, in consultation with the heads of departments, arranges for and addresses many of these meetings, which include details and complete demonstrations on the use of devices on safe and unsafe methods of doing work.

Safety bulletin boards are maintained at all convenient points to afford each employe an opportunity to be continually advised and given the benefit of the very latest suggestions in connection with his work.

All of this safety work is carried on with the advice and assistance of an independent organization, specializing on this kind of work and which also renders similar service to other companies. The central committee considers all recommendations submitted by lesser committees, etc., on all topics for safety movement, keeps records of all accidents, and by means of bulletins and speakers keeps the organization informed of all progress, so that the interest of the members will be kept at the highest pitch at all times. It also advises such recommendations to department heads, with regard to hazardous conditions or methods and suggestions as to changes which may seem advisable. It also has full and complete authority over the entire safety organization and takes care of all the expenses and other matters bearing directly on the progress and betterment of the movement.

In order that the work may be accomplished with greater ease and at the same time with less labor on the part of the few members, it has the power to delegate such of its duties, between meetings, as seem wise, to an executive committee, called the Commonwealth Edison Safety Bureau, composed of the chairman of the central committee on safety, the inspector of safety, the head of the claim department and, ex-officio, the manager of the Bureau of Safety. The central committee holds meetings at least once a month.

The intermediate committees consider and pass upon all recommendations that may come from the employes' organizations. These committees likewise care for all topics for safety movements, such as are proposed by a member, and forward to the central committee any recommendations that may accrue from such deliberations. In order to insure immediate action a copy of each recommendation is sent to the proper department head, also to the central committee.

The 38 employes' safety organizations meet at least once in two months, where discussions are held pertaining to the movement and where timely remarks by the inspector of safety or a member of the Bureau of Safety, or both on some occasions, are made and suggestions on safety matters are offered by the members.

Perhaps the most effective plan that has thus far been adopted by this company for accident prevention in connection with this work is the holding of these employes' meetings. Every employe attends these meetings as often as possible. Encouragement is given the members to ask questions, make suggestions and offer their views on any phase that will assist in developing the idea of greater safety. The policy has been that it is easier to prevent an accident than it is to report one. This is helped by suggestions

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made in writing and these are discussed at these open meetings, and the results are forwarded to the intermediate committees.

The fact that the men employed in the various departments are in a position to see wherein a possible avenue for danger lies, makes their recommendations of special value in this work. They are taught that accident prevention has a real significance for them. It is pointed out to each that it is far more commendable for him to use his brains and to take a little precaution in every step of his work, than to suffer the loss of an eye, or a hand, or meet with some other serious accident. The safe plan is made apparent by every possible safeguard. He is shown the futility of risking his life, leaving behind a family, many times wholly unfitted for the grave responsibility of life without a breadwinner. The fact that life is sweet, and the importance of conserving it are reasons why ample precaution must be taken to avoid accidents. The highest aim here has been to inculcate in the mind of the employe the necessity of thinking. This demands time and to enforce it most effectively, every possible method has been adopted that will be a continual reminder to the employes.

At points of vantage there are displayed large signs, 10 by 24 inches, with red background and white letters, bearing the inscription "The Best Safety Device Known is a Careful Man." In addition to these signs there are posted every few weeks various bulletins which are forceful reminders of the folly of hazards and risks and thoughtless acts. One hundred and fifty of these are placed at the various stations, sub-stations and other points of vantage on the several properties. The force of these are powerful safety sermons many times. In every pay envelope is placed a little ship of green paper on which is printed some slogan. These have different suggestions on each pay day. A man is reminded that he must not only watch out for his own safety, but must act as a continual friend to his fellow worker. A word of advice, given in a kindly spirit, will often do much to make another see a danger, and will prevent many serious accidents. He is expected to use his gray matter, for thoughtlessness is the underlying cause of the largest number of accidents in all undertakings.

A well-known man, who is an inspector of safety and fire prevention, says that the work has progressed so far that the results have begun to prove the success of the movement. He is an ardent advocate of the safety movement and it has become to him one of the vital factors in industrial undertakings. He secures statistics of accidents to present in his talks to the employes, and with these before him, and in other ways, he proves to them how great is the necessity for watchfulness. Since the inauguration of the movement by this company the number of accidents has been reduced 71 per cent. In the year 1914 there were 8 fatal accidents among the employes of this company, and up to August 10 of the present year only one fatal accident had been reported. This was an avoidable accident.

It is to make men think of the consequences of their acts which actuates the desire of the company in this movement. If men would only use their brains there would be few accidents. In the largest number of these cases the fault lies, not with the equipment or the physical defects of the property or apparatus, but in the risks and thoughtlessness of the worker himself, proving that men are the sufferers from their own errors. We cannot undo any act that has been the direct cause of accident, but we can prevent these accidents by a greater foresight. A book of rules is issued annually by the company, and this assists in making the various labors of the employes more easily recognized. Each department has supplementary rules covering in detail the particular duties of each section. These are discussed at the various employes' meetings, and in this way it is sought to force attention to some simple matters which might otherwise be looked upon as of little moment. The effects of previous

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accidents are made a lesson for thoughtful consideration. If the employes therefore become careless, the fault lies with themselves, and the blame attaches only to the man.

Charts, diagrams and other detailed matter are prepared and exhibited at the meetings of the employes, showing the number, nature and cause of accidents. How to avoid these and similar disasters is made plain, and it might be added, a thorough plan is outlined so that each worker may be better fitted to undertake his task in a way that will be most beneficial to him.

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No. 204 Co-operation in Safety Work.—Much has been said and written of "Safety First," yet when all is said and done, safety first means co-operation on the part of the boss as well as the man. In fact co-operation on the part of all who are in any way connected with the industry. The boss' co-operation means much because it means not only helping to avoid industrial accidents, but putting the right man in the right place as well. He [the boss] must be alive to observation, and realize the capabilities of the men in his charge. It must be through him that the men are made to feel that safeguarding of machinery is safeguarding their lives. The piece worker must be made to realize that a finger, hand or arm is a much more valuable asset than an extra dollar in the weekly pay envelope. If an accident does occur through the shop, it is a wise thing to have the foremen and their assistants see the case; it will make a more vivid impression than all the pictures you could show them. Humanity demands tangibilities.

The men ought to have it impressed upon them that taking a chance is not bravery, but foolhardiness, and that the man who takes chances is not a desirable employe. It is a great deal better "To be sure than sorry," and this ought to be a good slogan for the "Safety First" man. The safety first man should also keep watch and impress upon the men the danger of wearing rings on fingers, especially for those who are working at and around machinery, where there is danger of the ring being caught on some part that is in motion and the finger is drawn in, the result being the loss of a finger which otherwise might have been only a slight abrasion or cut.

The immediate investigation of an accident ought to do a great deal to prevent the recurrence of a similar case. Finding out where the defect lies and remedying same. The personal habits of the employe have much to do with his efficiency, and naturally his efficiency has much to do with the prevention of industrial accidents. The efficiency that comes of proper ventilation, proper feeding, cleanliness of body and the desire to further themselves will also further industrial safety. The man ought to be encouraged to use baths, if they are provided by the company, and, if not, he can be advised as to the nearest public bath house. After a hot, dusty day in the shop a bath ought to be a most grateful treat, and much more desirable than the ever present pail of beer. Every accident, no matter how trifling, should be immediately reported to the foreman, as it will often save a great deal of needless

Prizes for November Articles

First Prize. No. 197. *John Annal, Safety Inspector, Aetna Life Insurance Company, Chicago, Ill.*

Second Prize. No. 196. *J. C. Smith, Chief Safety Inspector, Inland Steel Company, Indiana Harbor, Ind.*

Honorable Metion. No. 198. *Charles M. Young, Machine Designer, Thomas Potter Sons & Company, Inc., Philadelphia, Pa.*

Other meritorious articles were contributed by Harry C. Palmer, Engineer, Buffalo Gas Company, Buffalo, N. Y., and F. A. Williams, Safety Engineer, Yonkers, N. Y.

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investigation. Many times a man comes, day after he has been injured, with the old story "It did not hurt at the time, so I did not pay any attention to it, but it began to hurt today." It should be thoroughly understood by men and foremen that minor and major accidents must immediately be taken care of. The man at the emery wheel should be made to know that goggles are part of the job, just as essential as the wheel, and the man who finds the goggles a burden ought to be made to feel that he is an unnecessary burden to the company that employs him.

The question of footwear should not escape the safety man. An old worn-out sole is an ideal spot for a splinter, nail or piece of scrap to imbed itself, not stopping with the sole but often making a nasty puncture wound which is highly dangerous, as we all know the probability of lockjaw or tetanus. Therefore, "Safety Man," look after your soles. The safety man has much to combat in the way of ignorance and low grade intelligence on the part of the average industrial laborer, but with constant admonitions and constant pounding away, there is bound to be some result eventually which will be satisfactory to all concerned.

Comments by Members of the Committee

No. 197 expresses my sentiments entirely. Small plants feel the expense of an additional employe to act as safety engineer and no loss of time for safety meetings can be met under existing competition, but once get the man who owns the job interested and 90 per cent of the difficulty is overcome.

I have never read anything more true to "life" than article 197, describing actual happenings in the experience of an inspector. As he says educating the workman is as nothing compared with educating the man who owns the job. In my opinion there is where the whole thing begins and ends.

The author of No. 198 has the right idea with reference to mechanical guards. By having the guarding incorporated in the original design we strike at the root of the trouble immediately. Such guarding can be done more economically than after the machine has been set up.

Article 196 sets forth in a clear and comprehensive manner the important subject of monthly safety bulletins. All safety men know that education is the most important part of a safety campaign. The monthly safety bulletin is one of the best means for accomplishing that purpose.

In order to get a chance to improve the working conditions of the employes one must get the co-operation of the management. They are the first trenches in the "Safety First" attack to be captured. The experiences related by the writer of 197 are common occurrences in the work of a safety engineer.

The ideas of No. 198 are quite sensible, and certainly practicable in the majority of cases. A man buying anything else, costing as much as a modern machine, would insist upon having all the latest improvements attached before delivery.

No. 197 emphasizes the necessity of education for "the man higher up." We are progressing favorably with the education of the workman, but unless the men "higher up" are in hearty accord with the safety movement, one cannot hope for the success which should crown these efforts.

The man who knows safety from all its angles is the man who can teach safety. In Article 196 our informant clearly shows that he knows the game. He has been through the mill. His article shows clearness of vision. He is the kind we need to spread the gospel of safety education.

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No. 197 describes experiences common to inspectors dealing with employers who were not born in the church of "Safety First," or who have not been prevailed upon to hit the trail that leads to the mourners' bench. Fortunately some safety men have to deal with superintendents who are willing to listen to reason. If their opinions have already been formed from incorrect assumptions, they can be changed.

In 197 a vital factor in the prevention of accidents and the betterment of plant conditions is ably treated. Were some means devised for convincing all employers of the moral, social, and economic benefits to be derived by correcting hazardous conditions and practices, accident prevention, would take its own course and the factory inspector would no longer be a necessity—or a "pest."

No. 198 touches the right spot when he lays the responsibility on the machine designer. "Safety First," cannot be impressed too much on designers of machines; therefore a designer who gets out a well built machine, should not spoil it by providing flimsy, unsafe guards. The men who design machines are men of inventive genius. For that reason they are better fitted than most people to devise effective safety appliances. Therefore, they should lead in the work of safeguarding machinery. No. 198 has started the ball rolling in the right direction. I hope he may soon hear, along the same line, from many of our leading safety engineers.

How Safety Goggles Save Eyes

OBJECT
LESSON ON GOGGLES
THE MEN WHO DID NOT WEAR GOGGLES
THE MEN WHO DID WEAR GOGGLES
GOGGLES THAT SAVED MANY EYE INJURIES
WHEN YOU DO WORK THAT REQUIRES GOGGLES WEAR THEM BY ALL MEANS

Courtesy of New York Central Lines.

Six men employed in the Collinwood Shops of the New York Central Lines who Lost Their Eyes because they Did Not Wear Goggles, and Six Other Men who Saved Their Eyes because they Did Wear Goggles. The men were all employed in the same shop, which is one of the largest of the New York Central System

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"The Fight Against Fire"

Conservation of Life and Property By Safe Construction, Fire Prevention Methods and Fire Protection

SAFETY ENGINEERING offers each month one First Prize of $10.00 *and one Second Prize of* $5.00 *for Articles, Suggestions, etc., relating to Safe Construction, Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 83 MAKING FIRE FIGHTING POPULAR.—If we review the work that has been taken up and already accomplished by the National Safety Council and by the National Fire Protection Association and other associations of like object, we have cause to congratulate those instrumental in starting and carrying on this great movement so successfully. Some of us may even say, "What is there left that I can do?"

Very often there is a certain loss of interest, a lack of enthusiasm, and a diminishing of the first successfulness takes place after a movement is well started. Perhaps the tendency of many to let a well-launched project take care of itself may be the cause for this lack of momentum.

But projects, however good and successful, will not push themselves. It is the personal element that counts, the individual work that tells.

The starters must be leaders, and day by day new adherents must be gained. To insure continued and increased success in any line, that line must become popular. It must reach the people in some way.

It seems sometimes that there is nothing new under the sun, that the limit has been reached in new methods to attract the attention and win the co-operation of the public. And yet new ways of putting things, new combinations and uses of old methods are always cropping up.

The man who can make one safety idea grow where none grew before is going to start something, for from each new idea, each new plan, each new adherent, others will spring. Are you doing your part to make prevention a success?

How ready people are to help in relief work, especially if someone takes the leadership who knows the value of concerted action!

A great accident where property and life are lost arrests our attention immediately and reaches us through our sympathies.

"First aid to the uninjured," as someone has called it, once started has many appeals. It is just as kindly, just as necessary, and numberless times is more efficient.

How many of the organizations already in your community are working along this line? How many could? How many could you interest?

Many people are coming to see the value of preventive work in relation to sickness, crime and poverty. Perhaps your church has taken up these questions. Why not have a Fire Prevention Sunday as well as a Tuberculosis Sunday?

Teaching the people to care for themselves and their brothers before would be a work of humanity and religious duty as much as taking collections for the maimed and homeless after. This a sure way of being your brother's keeper.

If you live in one of the twenty States having laws safeguarding school buildings, do you know whether these laws are enforced or whether there is any provision for enforcement? The schools belong to all the people. Is your school teaching fire prevention?

How about your home and your neighbor's homes? Are you careful or careless and indifferent? Are you fire-wise or ignorant? With your co-operation the National Fire Protection Association could put its literature into every home.

Could you interest clubs and lodges in this kind of "relief" work? As a business man, a member of the Chamber of Commerce or other public body, are you

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advancing protection ideas? Are building and housing regulations being enforced? Are your legislators interested in preventing loss of life and property by fire?

Your home, your church, your school, your business, your community and government are the main lines and these are split up into many branches, each of which should do its part in making life safer.

Y. M. C. A.'s may be interested in fire prevention and through courses of study may fit young men for safety engineering positions.

Schools and colleges should also be interested in preparing students for such vocations.

You can help in your town in securing the co-operation of the Boy Scouts, the Federation of Women's Clubs, fair associations, libraries, dailies, your grocer, your milkman, everyone with whom you come in contact.

The "movie" is being used to a certain extent in this prevention work, but it has still undeveloped possibilities of usefulness.

The Massachusetts Society for the Prevention of Cruelty to Animals and the American Humane Education Society, Boston, have offered a prize for a scenario for a moving picture which shall illustrate the value of humane educations. Why not prizes for scenarios which shall illustrate the value of fire prevention?

"Movie" stars could be interested, not in fire sufferers' "benefits," but in the benefits of preventing fires.

The great magazines, the story writers, the song composers can all find something to do in lessening the terrible toll exacted each year by fire.

GET BUSY MAKING FIREFIGHTING POPULAR.

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No. 84 SAFEGUARDING SCUTTLE OPENINGS.—I wish to make a suggestion on the opening of scuttles in tenement houses during the progress of a fire. When a fire starts in a tenement house it naturally goes up, and the result is that the top floors become charged with smoke and heat. When tenants living in upper floors see the smoke-filled hallways, they rush upstairs to make their escape by way of scuttle to roof, but on account of the great heat around the scuttle opening they are overcome and fall unconscious, and many lives are lost in that way. Now my suggestion would be to compel owners of tenement houses to have a long pole or some other device that could be used to open these scuttles from floor below.

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No. 85 FACTORY FIRE BRIGADES.—Much could be written on the subject of the organization of factory fire brigades without really adding much to the general information of what to do and how to do it, as the organization of any number of men, be it small or large, is based on a few fundamental principles which hold good in more or less modified forms in any case, and any efficient organization must be based on the correct conception and execution of those underlying principles.

There are always people who have an idea that a recipe can be compounded for everything, and it is usually that class of people who bring about disastrous results when they attempt to organize anything, because of a lack of individuality and judgment to decide what applies to their particular case.

The following may be considered as essentials in the proper organization of effective fire brigades with a view of interesting the men in such organizations:

1. Provide facilities to fight the fire with plenty of water, hose, chemicals, extinguishers, ladders and other necessary firemen's implements.

2. Insist on regular inspection, proper maintenance, repairs and replacement of equipment.

3. When called out, the officers of a volunteer organization must lead. The men will follow. Do not expect a fireman to do what you, as an officer, would be afraid to do yourself.

4. Compensate the men suitably for their efforts.

5. Look after and care for men who are injured in the performance of their duties.

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An organization of a factory fire brigade along these lines will interest the men to do their duty and prove themselves efficient.

It is well to incorporate into such organizations the suggestions or recommendations of insurance companies, as their diversified experience is certainly of value. Such recommendations usually are made after financial loss has been suffered, and are made to prevent a repetition of such losses.

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No. 86 THE ISOLATION OF FILM MANUFACTORIES.—A fire which recently occurred in a five-story film-manufacturing plant on the upper west side of New York City, consuming the entire building and contents, besides injuring a number of firemen and nearly destroying a whole city block, as well as endangering the lives of hundreds of tenement dwellers, amply demonstrates to the public the necessity for the manufacturers of films to have such plants situated as far as possible from nearby property, especially away from the crowded tenement section.

Only the prompt arrival of the fire department at this fire, and the skill and judgment of the officer in command in the disposal of his forces, prevented the destruction of the entire street. The heat of the fire was so intense as to penetrate the brick walls, and necessitated the sending of a fifth alarm in the high pressure district. Explosion after explosion shook the entire structure and it was necessary to order all of the tenants in the vicinity to vacate their homes immediately.

The poisonous fumes arising from the celluloid films caused quite a number of persons to be removed to nearby hospitals. The ingredients entering into the manufacture of these films are composed of the most dangerous chemicals. It was most fortunate that a greater number of people were not affected.

As every fire teaches some lesson, the most important lesson to be derived from this fire is that plants used for motion picture film manufacture should be isolated and constructed adjacent to the river front, in strictly fireproof buildings, sprinklered, with fire appliances throughout, and far away from the heart of all neighboring property.

Prizes for November Articles

First Prize. No. 80. *C. E. Worthington, John C. Paige & Company, Boston, Mass.*

Second Prize. No. 82. *James P. Welsh, Chief of Fire Department, Eau Claire, Wis.*

Honorable Mention. A tie. Nos. 79 *and* 81. *William Philip, South Orange, N. J., and James A. Tierney, Inspector, Bureau of Fire Prevention, Division of Public Assembly, New York Fire Department, New York City.*

Comments by Members of the Committee

No. 80 corrects a popular idea as to the origin of many fires, and to one familiar with the actions of rodents in carrying off oily waste, rags, etc., the writer of the article mentioned brings home the seriousness in delay in exterminating the pests.

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As No. 79 says we all know that the posting of signs is useless, if the men higher up neglect to observe and obey their own edicts and thereby set a bad example for their employes. It is negligence of the extreme type for an employer or his superintendents and foremen to go through their place smoking. Employes lose respect for the signs and take their own little puffs—which may result in a dangerous fire.

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There are few of us who have witnessed fires in the residential districts of the smaller cities and towns, or, in fact, in the less densely populated sections of

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large cities, who have not seen valuable property sacrificed to the use of the wooden-shingle roof. The continued very extensive use of this sort of roof covering seems to be an illustration of the inertia of habit. When other sorts of roofing were not so abundant as now we got into the habit of using wood; the habit is slow to change. It is hard to explain the situation otherwise. The wooden shingle certainly has not a great deal to recommend it from the standpoint of the artistic. It holds no enviable record of durability or lasting qualities. As a flying fire-brand, or as a thing readily ignited by flying sparks and the like, its history is universally bad. Yet its use continues. The suggestions of No. 82 concerning publicity for nonflammable roof coverings are entirely timely, it seems to me.

* * *

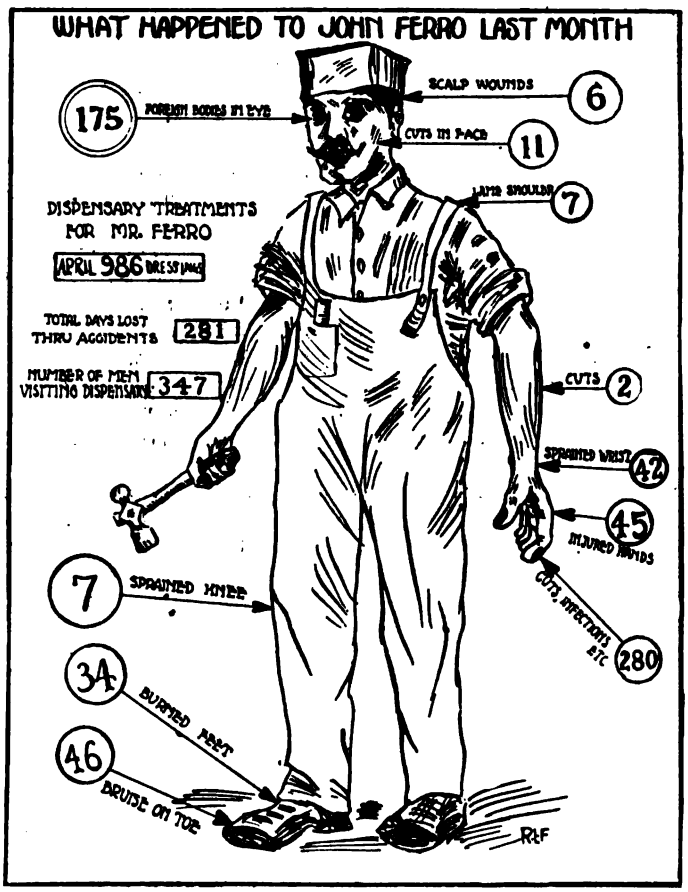
As motion pictures have become an institution, the proper environment must be created. No. 81 in all respects, excels in practicability, adaptability and in fire prevention suggestions.

Woes of a Composite Workman

JOHN FERRO is the symbolic composite workman in one of the plants of the Ferro Machine & Foundry Company, Cleveland, Ohio.

This picture is used each month to show the men not only the number of ACCIDENTS during the month, but also the number of DRESSINGS required to prevent minor accidents from becoming serious ones. Small reproductions of the cut are printed on the pay envelopes. Large blue prints are placed on all the bulletin boards of the plant.

During the month for which this picture was made, John went to the dispensary for 986 dressings. His fingers and eyes were hurt more often than other parts of his body.



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Electric Railways

By George Oliver Smith

Chairman Electric Railway Section, National Safety Council.

AT its fourth annual congress, the National Safety Council brought out many new and interesting ideas. During the convention, sectional meetings were held by companies interested in the Electric Light, Power and Gas end of the public utility business, and in these meetings some electric railway companies were represented.

A pressing need was felt, however, for two distinct sections to cover the public utility business. One to be the Electric Light, Power and Gas Section, the other to be devoted to the interests of Electric Railways, covering not only street or city systems but interurban and electrified steam railways also.

There appeared to be a large field in which the Electric Railway Section could engage—the possibility of being of material assistance and benefit to the electric railways in the study of accidents (which are occurring to both their own employes and to the public), in getting out standard plans, in determining upon methods of procedure, in the nature of preventive measures and in furnishing advice as regards the conduct of definite accident prevention campaigns.

Hitherto the smaller city system or interurban has not been in a position to conduct either accident prevention campaigns among its own employes or the public, due to the fact that plans and methods were, perhaps, not available. A small company would have to do considerable development work before it would be able to proceed. That has meant putting unnecessary burdens, financial and otherwise, on the smaller company. Energetic accident prevention work has been somewhat neglected perhaps for this reason. The hope of the Electric Railway Section is that the smaller city and interurban railway companies will be able to apply to this section, and that the section will be able to supply them with information and data that will give them a comprehensive plan as to how to conduct accident prevention work.

Only by the co-operation of every street and interurban railway in the country, and by their joining the National Safety Council and affiliating with the Electric Railway Section, can the "main objective" of the section be accomplished. Therefore, it is up to every electric railway company to spend the few dollars which joining the National Council entails, and to avail itself of the benefits of the National Council, through the particular section which is to have its interests in hand.

Ninety per cent of the accidents to employes in street and interurban railway companies are preventable. It is not only the actual cost of medical attendance, nurses, hospital fees, and, perhaps, other monetary compensation that makes this branch of the operating expenses of electric railway companies higher than it should be. The element of lost time, is, perhaps, the most costly. Each day that a man is absent from his regular run puts added worry on the operating executives of the company, for the reason that substitution of men in positions with which they may not be entirely familiar involves a large element of risk; for even though the substitute may learn his duties and properly perform them, there is a period between his taking them up and before he becomes familiar with them which is apt to be costly to the company. Therefore, when employes are absent from their regular duties through the result of an accident which could have been prevented, the whole organization suffers.

The item of expense to interurban and street railways through accidents to the public is heavy. Through active educational work among the employes, and by means of educational work among their patrons, some companies have succeeded

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in bringing to the attention of all the necessity for preventing accidents—by thoughtfulness and by being on the watch for the conditions which cause accidents. There is no reason why an electric railway company should expend money in the payment of accident and damage compensation to the extent of 20 per cent of its gross earnings. Yet such cases are not unheard of.

The keynote in all accident prevention work among employes of electric railway companies is the arousing of interest in each employe and having him feel that it is *his* duty to guard against accidents, both to himself and to the public, at all times. If he is properly educated and instructed, and if his company has the information and data with which to instruct him, the desired results are bound to occur.

As previously stated, the small company is not in a position to spend much money to obtain the information and data. On the other hand, the larger city systems and interurban railways have done a great deal along this line. With the co-operation of the larger system, their supplying the Electric Railway Section and the National Safety Council with information and data to be compiled and distributed among the smaller companies, the Electric Railway Section can be of very great assistance.

The study and analysis of accidents which have occurred, with a view to supplying electric railway companies with information which will lead to the prevention of similar accidents in the future, is to be an important phase of the work of the Electric Railway Section.

The Electric Railway Section hopes to do a great deal in the field of accident prevention. But that can only be accomplished by all the electric railways throughout the country getting behind the section, boosting for its success and contributing to its support by their membership in the National Safety Council.

It is hoped that weekly distribution of data and information may be made which will apply only to electric railway companies.

Officers and chairmen of committees of the Electric Railway Section, designated by the National Safety Council to act during the coming year, are as follows:

OFFICERS.

Chairman: George Oliver Smith, Supervisor of Safety, Doherty Operating Company, 60 Wall Street, New York.

Vice-Chairman: Edward C. Spring, Assistant to the President, Lehigh Valley Transit Company, Allentown, Pa.

Secretary: C. B. Scott, Manager Bureau of Safety, Middle West Utilities Company, Chicago.

Assistant-Secretary (to be appointed).

STANDING COMMITTEES.

Membership: H. A. Bullock, Staff Assistant to the President, Brooklyn Rapid Transit Company, Brooklyn, N. Y.

Standardization: (to be appointed).

Accident Study and Analysis: Rex D. Billings, General Claim Agent, Reading Transit & Light Company, Reading, Pa.

Program: H. Irwin, Claim Agent, Charleston Consolidated Railway & Light Company, Charleston, S. C.

It is earnestly hoped that great things may be accomplished by the Electric Railway Section. The officers and the chairmen of the standing committees take this occasion to ask for the co-operation of all those interested in electric railways.

The Bull's-Eye of Safety

Courtesy of Bureau of Safety, Chicago.

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Laundry Industry

Papers and Addresses at the First Meeting of the Laundry Section of the National Safety Council

Proceedings of the Fourth Annual Congress, National Safety Council.

THE Laundry Section meeting on Wednesday, October 20, 1915, showed that this important industry is eager to co-operate in the nation-wide movement for "Safety First." A constitution and a set of by-laws were adopted. Officers were elected as follows: E. G. Trimble, chairman; T. M. Jenkins, secretary. More than 80 persons were present, all of whom showed a keen interest in the proceedings. The program:

An Ideal Laundry Plant—Emphasizing Welfare Work. Miss Jane Seymour Klink, manager Welfare Department, Pilgrim Laundry, Brooklyn, N. Y.

Danger Features in Laundries, Including Extractors and G Flat Work Ironers. M. F. Wilkinson, president Wilkinson Laundry Company, Reading, Pa.

Automatic Covers on Hydro-Extractors. C. W. Price, assistant to the Commission, Industrial Commission of Wisconsin, Madison, Wis.

Pneumatically Operated Laundry Machinery. J. Dewey, master mechanic, American Laundry Machinery Company, Rochester, N. Y.

Some Danger Places in the Average Laundry and How They May Be Safeguarded. John Woodhead, safety engineer, Employers' Indemnity Exchange, Kansas City, Mo. Illustrated with lantern slides.

In addition important points were taken up and discussed by Carl M. Hansen, author of the Universal Analytical Schedule of Rating and Inspection, and W. G. Ashton, Commissioner of Labor, State of Oklahoma.

The chairman pointed out that the laundry had become a big industrial factor. He called attention to the specialized machinery required in the steam laundry of today, and how special instructions should be given to employes on "Safety First," the fundamental principle of which is self-preservation and watchful care for the lives and limbs of their fellow-men. The first number on the program was an address by Miss Jane Klink, of the Pilgrim Laundry, Brooklyn, N. Y. Miss Klink, being unable to attend on acount of sickness, sent a paper, which was read by the chairman.

At the request of the chairman, Mr. Hansen gave a brief but interesting talk on the aims of his system, which is now in use in many States. He said that one of the results of safeguarding and credit rating was the saving of $900,000 of life and limb in one year in one state, and that the system has been substantiated by three years' experience, sufficient data having been gathered during that time to justify what might appear to be drastic measures in some plants.

The meeting developed, in the main, two very important matters: (1) The social welfare of laundry employes; (2) How to bring a laundry to the highest point of safeguarded efficiency.

That welfare and safety work tends to a better understanding and more cordial relations between employer and employes has been amply demonstrated. In an instance cited at this meeting, it was learned that the employes take their lunch in a well-appointed dining room, the menu being of a wholesome nature and the charges nominal. A trained nurse and a dispensary are provided for "first aid." During the winter season social entertainments of various kinds are arranged at stated periods, the employes working hand-in-hand to make each event a success.

By the means of quiet talks and an earnest desire for their welfare, employes are taught to cultivate a "four-square" moral life, and a sincere attitude toward the employer, with the result that dishonesty is little known, and when the time comes to sever their connection with

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the firm, one testimonial is invariably given by the employe: "I feel the better for having worked in your plant."

The moral, Mr. Laundryowner, is: Show your employes that you are interested in their welfare, and you will be repaid with better service and a cooperative spirit that will leave no necessity for the labor organizer to enter your doors.

The matter of protecting life and limb by efficient safeguarding, brought forth many excellent short talks on the following subjects:

Fencing the Flat Work Ironer.

Automatic Covers for Extractors.

Suitable Guard for Body Ironer.

Standard Gears for Belts, Pulleys and Flywheels.

Eliminating the Slippery, Starchy Floor, etc.

The flat work ironer has been found to exact the highest percentage in "limb" value, and it was strongly urged that all laundrymen take the necessary precaution and provide adequate fencing, whereby operators will be prevented from reaching over the rolls. In this particular, human appeal is not enough. The best safeguard against crushed and burnt limbs is a proper fence on all four sides of the machine.

The value of the automatic cover for extractors has been fully substantiated. In the State of Wisconsin the matter has received such close attention that the Industrial Commission has made it a law that each laundryman must equip his extractors with the "fool-proof" cover. The difficulty of attaching this latest device to some of the old extractors has been solved by a mechanic in the city of Janesville, Wis. Although the invention is yet only in its first stages of demonstration, it has been proved to be successful in many instances, and will no doubt be on the market in a short time. In the State of Oklahoma it has been found that nothing but the automatic extractor cover will do. Within the last six months three arms have been lost on account of extractors not being so equipped. When the Industrial Commission of Wisconsin made the "Fool-Proof Cover" law, it found the laundrymen ready to cooperate heartily. This example, it is to be hoped, will be supported by all employers in the laundry industry throughout the United States. "Safety First" is a most humane movement, and its principles have been placed on the efficiency plane in dollars and cents. This has been proved, especially in the State of Wisconsin, where a distinct credit off the basis rate is given for extractor cover efficiency. This credit, it was pointed out, can surely be likened to an investment of money in a dividend paying proposition.

Standard guards for belts, pulleys and flywheels, it was suggested, should be made up of a framework of angle iron or iron pipe, filled in with perforated iron, which is much more durable, more sightly and less of a fire feeder than a guard made of wood.

The concluding item in the program, by John Woodhead, safety engineer of the Employers' Indemnity Exchange and Employers' Indemnity Corporation of Kansas City, Missouri, was an address illustrated with lantern slides showing some danger places in laundries and how to safeguard them, which very appropriately and graphically emphasized many of the features previously brought up.

Fireproof Santa Claus

FIRE warnings for the holidays having been issued from numerous fire prevention sources this year, there has been an editorial welcome to "The Fireproof Santa Claus." The *Evening Sun*, New York, remarks: "For his own protection his whiskers are henceforth to be made of asbestos. Then he can singe them with matches and brush them through the flames of the Christmas tree candles with perfect impunity, and we won't be in terror lest he be momentarily roasted alive. Taking into consideration the fact that the whole world is now engaged in setting fire to itself the precaution is, indeed, a very wise one on general principles. 'Safety First' for Santa!"

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Iron and Steel

THE first regular meeting of the Iron and Steel Section, National Safety Council, was held at the Bellevue-Stratford Hotel, Philadelphia, October 21. Those present:

M. H. Shea, Philadelphia.

Norman T. Smith, Philadelphia.

Walter Greenwood, Carnegie Steel Company, Youngstown, Ohio.

D. Curtis Williams, National Tube Company, Pittsburgh.

W. T. Cohoe, Union Casualty Insurance Company, Philadelphia.

J. Claude Smith, Inland Steel Company, Indiana Harbor, Ind.

F. H. Wilcox, Federal Bureau of Mines, Pittsburgh.

Stanley H. Kershaw, Independence Inspection Bureau, Philadelphia.

James M. Woltz, Youngstown Sheet & Tube Company, Youngstown, Ohio.

Walter E. Chick, Pennsylvania Steel Company, Steelton, Pa.

C. M. Brading, Wisconsin Steel Company, South Chicago.

John Schilling, Jr., William Cramp & Sons, Philadelphia.

W. H. Cameron, Illinois Steel Company, Chicago.

A. C. Cook, Carnegie Steel Company, Youngstown, Ohio.

H. E. Metcalf, Draeger Oxygen Apparatus Company, Pittsburgh.

Harry O. Eichbay, John Eichbay, Jr., Company, Pittsburgh.

Leslie M. Rice, American Steel & Wire Company, Worcester.

Edward M. Peake, Carnegie Steel Company, Pittsburgh.

H. A. Schultz, American Steel & Wire Company, Philadelphia.

E. R. Rose, Republic Iron & Steel Company, Youngstown, Ohio.

A. H. Lintz, American Steel & Wire Company, Pittsburgh.

Geo. T. Fonda, Bethlehem Steel Company, South Bethlehem, Pa.

J. L. Junkin, LaBelle Iron Works, Steubenville, Ohio.

J. Stanford Brown, The Carpenter Steel Company, Reading, Pa.

J. B. Ayres, National Tube Company, McKeesport, Pa.

Robert J. Young, Illinois Steel Company, Chicago.

Mr. Ayres, of the National Tube Company, called the meeting to order. The report of the nominating committee for officers for the ensuing year was adopted unanimously, electing the following named:

Chairman, J. M. Woltz, Youngstown Sheet & Tube Company.

Vice-chairman, Geo. T. Fonda, Bethlehem Steel Company.

Secretary, Earl B. Morgan, Commonwealth Steel Company.

Bv-laws were adopted. Consideration of the work to be carried out by the section was deferred awaiting the action of the executive committee of the National Safety Council. It was voted that each member of the Iron and Steel Section should receive a complete mailing list of the members of the section in order to facilitate the interchange of bulletins, etc.

Gas Industry

THE accident prevention motion picture, "Be Careful First," arranged by the Accident Prevention Committee of the American Gas Institute, under the direction of James B. Douglas, is attracting considerable interest. In the two reels composing the picture many illustrations of the causes of accidents are shown graphically. The film was shown at the Safety Congress in San Francisco and at the annual convention of the National Safety Council in Philadelphia. Its latest appearances have been before the employes of the Madison Gas & Electric Company, Madison, Wis., and the employes of the United Gas Improvement Company in Philadelphia on December 9.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

"SIMPLICITY" ELEVATOR DOOR CLOSER

The desire of the Morris Manufacturing Company to protect its employes against open elevator shafts and to comply with the law of the State, resulted in the invention of the "Simplicity" Elevator Door Closer. It consists of a safety arm attached to an iron bar. The device is attached to the wall of the door opening. An ascending or descending elevator operates the safety arm, which in turn releases the door, permitting it to slide shut. The door is then locked by the safety arm dropping into a slot in the door. The arm does not go through the door, but fits exactly in the slot. An excellent feature of the "Simplicity"

is that the operator need not concern himself about the closing of the doors, but can devote his entire attention to running the elevator.

Due to its simplicity, the cost of this device is nominal and the expense of installation is trifling. There are no parts to replace, nothing to wear out and nothing to adjust.

The Morris Manufacturing Company, 10 Cross street, Newark, N. J., has issued a booklet which illustrates the working of this device. Copies may be had on application.

OHIO SAFETY EXPOSITION

The Second Annual Industrial Safety Exposition of Ohio, under the auspices of the State Industrial Commission of Ohio, will be formally opened in the Central Armory of Cleveland, on January 22, by Hon. Frank B. Willis, Governor of Ohio. The Exposition will remain open each day until January 29, from 10 a. m. until 10 p. m.—admission free.

The exhibit promises to be a great success. Ohio is the first State in the country to hold so representative a safety exposition. More than one hundred of the largest corporations, railroads and other companies will be represented, among which will be: New York Central Railroad; Queen and Crescent Railroad; United States Steel Corporation; American Car and Foundry Company; Youngstown Sheet and Tube Company; Republic Iron and Steel Company; Republic Rubber Company; Chandler & Price Company; Pickands Mather Company; Buckeye Steel Castings Company; Ralston Steel Car Company; Julius King Optical Company; Norton Company; William S. Tyler Company; *Safety Engineering;* Cleveland Fire Prevention Society; Goodrich Rubber Company; Goodyear Rubber Company; Otis Elevator Company; Templeton Kennly Company; Youngstown Safety Council and many others.

During the Exposition there will be a series of round table conferences on accident prevention, to be held each day in the lecture hall on the second floor of Central Armory. The Cleveland Chamber of Commerce, through its industrial committee, is co-operating with the State Industrial Commission, to make the Safety Exposition a success. It is expected that fully 100,000 workmen and employers from Ohio and other States will benefit by the educational features of the Ohio Safety Exposition.

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ALTERNATING CURRENT FIRE ALARM CONTROL

The operation of isolated fire alarm signal systems is satisfactorily accomplished by the use of current obtained from electric light service connections at standard potentials, this method of control insuring a dependable and economical source of current supply.

In many factories, required under recent State and municipal regulations to maintain fire alarm signal systems, alternating current only is available, and the accompanying cuts illustrate a recent development of fire alarm equipment suitable for direct operation from 110 to 125-volt alternating current service.

Fig. 1—One-Gong Circuit Control Board

Referring to the system diagram, Fig. 2, the conventionally shown positive and ground terminals at D-1 and D-2 are connected to a 125-volt alternating current lighting service, the terminals mentioned representing the main fuses of the control board, Fig. 1. The signal boxes E are connected to A-1 and A-2 and one or more series of gongs are connected to the terminals B-1, B-2 and E-1, E-2, etc. J is a trouble bell, G a time limit cutout, and H, H and I are indicating millammeters in series with bell and box circuits.

The equipment consists of a control board supplied with relays and instruments operating directly on alternating current potential and controlling the operation of one or more series of alternating current bells. The system is of the closed circuit type with box and bell circuits under the supervision of indicating instruments, which show their condition; a time limit cutout and accurately rated fuse that protect the apparatus in the event of abnormal current conditions. A loss of potential or an open circuit in the alarm system causes the trouble bell, operated by four cells of dry battery, to ring and the bell circuits are protected by a time limit cutout in the event of a box circuit becoming open.

In general, the system differs in no way from

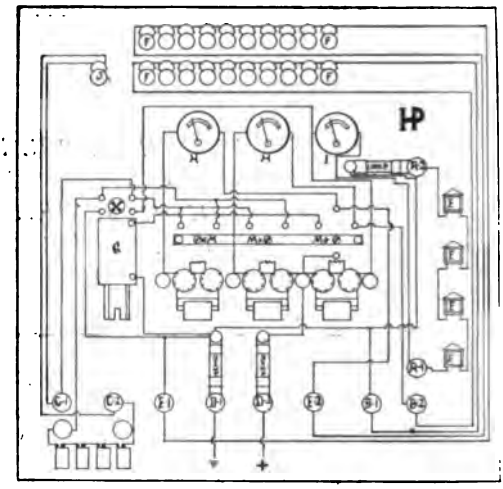

Fig. 2—Two-Gong Circuit Diagram

standard practice common to all closed circuit fire alarm systems, its specific value being in the design of the alternating current relays and bells which the manufacturers claim to be as smartly responsive to alternating current impulses as are direct current relays when used for similar purposes. The manufacturers further claim that they have been able to overcome all tendencies of relays and gongs to vibrate in step with the alternating current circuits, thus eliminating what would otherwise be an objection to the use of alternating current in signal systems. The control board and wiring system shown in cuts are the "New York Type", complying with the regulations of the New York State Industrial Board covering factory fire alarm systems. This apparatus is manufactured by The Palmer Electric & Mfg. Co., of Boston, Mass.

MAKING FILMS STEADY

The remarkable popularity which is now enjoyed by motion pictures for an almost endless number of uses, is largely accounted for by the vast improvement which has been accomplished in the perfection of these pictures. Millions of people are daily interested, amused and instructed by the clear, flickerless, lifelike reproductions which are thrown on the screen, and which portray the subject perfectly to the smallest detail. But to secure such splendid results has entailed a vast amount of hard work and inventive skill on the pioneers who took up the work of producing such perfect pictures as we see today.

Nicholas Power, of New York, was the man who chose for his life's work the perfection of the motion picture machine. His name today is known wherever the subject of motion pictures is of interest. How splendidly he has succeeded in his endeavors to produce a machine which would give perfect projection

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without a flicker, is shown by the remarkable success which has attended the machines manufactured by his company, the last of which, recently introduced, was the 6B Cameragraph.

Mr. Power has grown up with the moving picture industry. He has, step by step, gone through all the stages of development in this art. Projection has absorbed his profound interest and study for many years, and he, probably more than any other one man, is responsible for the perfect pictures which we enjoy today. He started his labors with the birth of the industry and applied himself seriously to solving the mechanical intricacies which had to be successfully overcome in the production of a satisfactory machine.

Mr. Power recognized the great fact years ago that moving pictures would never succeed unless they could be thrown clearly and steadily upon the screen, and the earlier projecting apparatus was what set him to thinking. He saw the necessity for much improvement before the moving picture machine could fill the great position which awaited it.

It required years of hard work and experiment for Nicholas Power to remove the "flicker" from the film, but this he has done, conserving the eyesight of all who look at pictures projected from a Power machine.

The fire hazard which was present in the earlier type of machine has been almost entirely removed in the 6B Cameragraph, through the safety features invented by Nicholas Power, who has also given this subject much attention in the design and construction of Power's Cameragraph.

SAFEGUARDING AUTOMOBILES AGAINST FIRE

The necessity for equipping automobiles with a hand fire extinguisher is now fully recognized.

Mr. Allen, sales manager of the Pyrene Manufacturing Company, recently addressed a Kansas City branch of the National Rotary Club on fire prevention applied to automobiles. He will address other meetings in different cities.

CHEMICAL ENGINE ON FORD RUNABOUT

How a Ford runabout can be transformed into a chemical fire-fighting wagon is shown in the accompanying illustration. Motor-driven fire-fighting apparatus is becoming more popular each year, and the Ford Chemical Wagon is adaptable for meeting the needs of small towns or villages that can afford to invest only a small sum.

As shown in illustration, the top and cover back of the seat was removed and two "Utica" Holloway 25-gallon tanks, hose basket with 150 feet of ¾-inch chemical hose and nozzle, two "Utica" No. 6 special fire department extinguishers, two lanterns and two canisters for extra charges were installed thereon.

The equipment was ordered for the fire department of Laredo, Texas, and was manufactured by the O. J. Childs Company, Utica, N. Y. This company can also furnish a 35-gallon tank which will fit crosswise, with hose reel and small hose body if desired.

Chemical Engine on Ford Runabout

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"SAFETY ENGINEERING APPLIED TO SCAFFOLDS"

Scaffolds are employed widely and by many different classes of workmen; but as they are erected for temporary use only, they seldom receive the thoughtful consideration that is given to permanent structures. Many fatal and serious accidents occur through the scanty attention given to scaffolding. Often they are designed and erected with little thought to safety. The result is, that bricklaying, carpenter work, painting, decorating, and many other operations in which men must work at considerable height, are often performed upon scaffolds that are distinctly dangerous, liable to collapse, and sometimes do collapse with disastrous results.

The scaffold hazard can be largely removed by giving the same careful attention to the design and erection of scaffolds that is given to the construction of the building itself. Building codes of our larger cities contain scanty reference to scaffold requirements. The time has arrived for demanding safe scaffolds upon which the workmen can be assured of safety, and no excuse can justify the hazard which a great amount of the scaffolding, now being used, presents to the workmen in the erection of buildings.

The Travelers Insurance Company, Hartford, has recently issued a 354-page illustrated treatise, "Safety Engineering Applied to Scaffolds" which constitutes a valuable addition to accident prevention literature. This book has been carefully compiled by the engineering division of the Travelers Insurance Company, and will be found of great help to those interested in the erection of safe scaffolding. The book is indexed and paragraphed by number, as a means of ready reference. The price is $3. Orders may be sent to SAFETY ENGINEERING.

BOILER ROOM EFFICIENCY

The Harrison Safety Boiler Works, Philadelphia, manufactures Cochrane Meters, and in a 68-page book, "Finding and Stopping of Waste in Modern Boiler Rooms," explains the value of feed water and condensate meters as aids in the management of power plants.

UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

ARC-STRIP SHINGLE ROOF COVERINGS, HEAVY PATTERN. Amalgamated Roofing Co.

INSIDE HAND-OPERATED DISCHARGE DEVICE. Kruecke Bros. Vertical, single-acting pump, designed for use with Inside Discharge Systems for handling hazardous liquids.

DOORS AND SHUTTERS, METAL-CLAD. Eclipse Fireproof Sash & Door Co. Tin-clad fire doors and shutters, designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD Feather & Roadhouse. Tin-clad fire doors and shutters, designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. O. L. Jordan. Tin-clad fire doors and shutters, designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. Mechanics Fireproof Sash & Door Co., Inc. Tin-clad fire doors and shutters, designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. John Vogeli. Tin-clad fire doors and shutters, designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, HARDWARE. The Safety Fire Door Co., Inc. Hardware of sliding type for standard tin-clad fire doors.

DOORS AND SHUTTERS, HARDWARE. Wagner Mfg. Co. Hardware of sliding type for standard tin-clad fire doors.

LIGHTNING RODS. Boston Lightning Rod Co.

METAL CABINET, INSULATED. The General Fireproofing Co. Insulated sheet metal cabinet. This cabinet has been shown by tests to be capable of protecting records, papers and similar contents from destruction by fire of moderate severity and duration when not subjected to severe injury by falling or by impact of falling bodies.

UNDERGROUND STORAGE TANKS. Chicago Steel Tank Co. Cylindrical steel tanks, designed for storage of hazardous liquids in connection with Isolated Storage Systems, Inside Discharge Systems, Gasolene Engines, etc.

SAFETY ENGINEERING WEEKLY FIRE REPORTS
$5.00 PER YEAR

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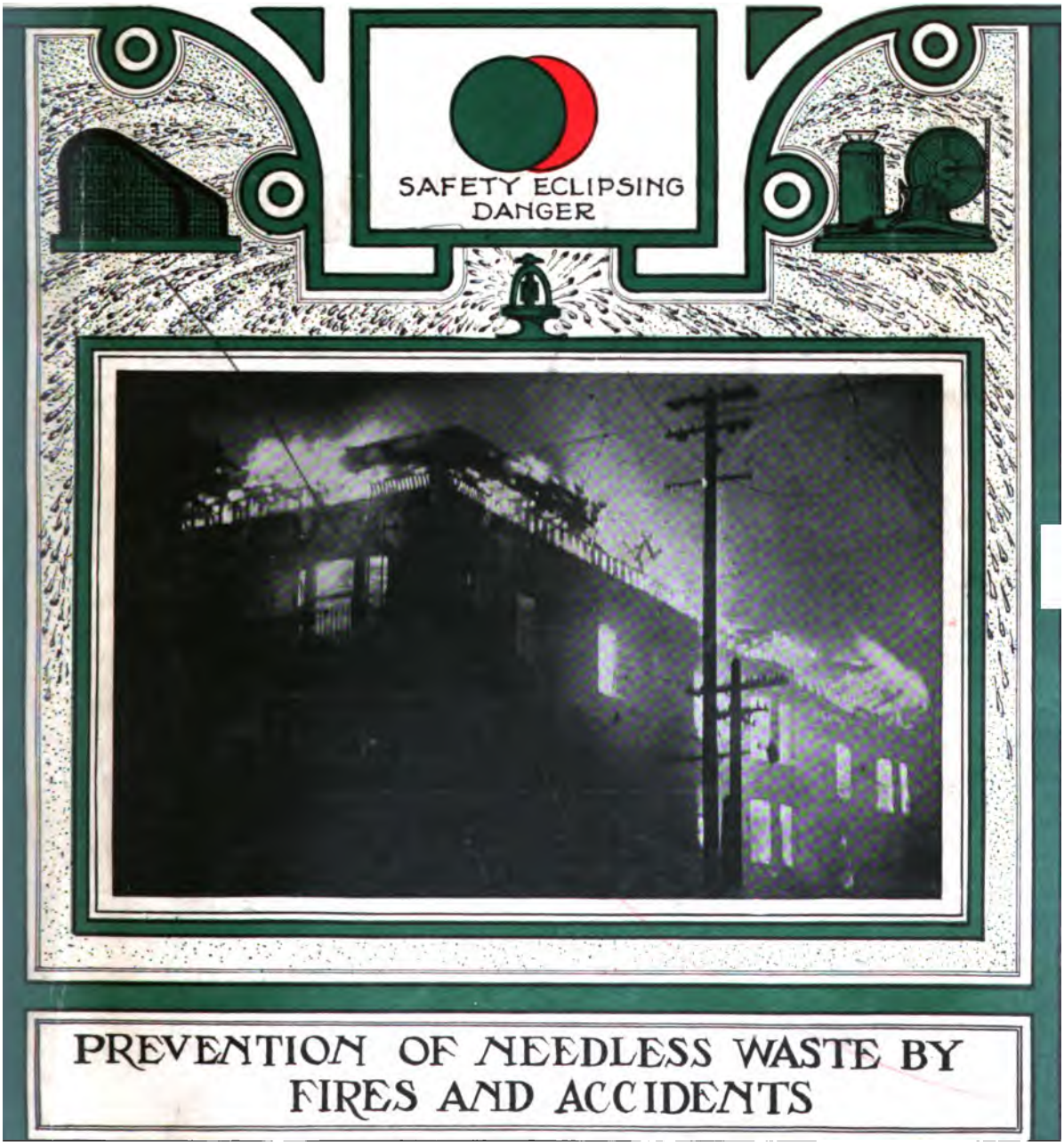

PREVENTION OF NEEDLESS WASTE BY FIRES AND ACCIDENTS

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Pyrene
TRADE MARK

PUTS FIRES OUT—QUICK

PYRENE is the quickest, surest fire extinguisher known. It is always dependable; it never deteriorates; it never requires re-charging; it does not freeze; it never damages; no matter on what it is used it leaves no trace. Its stream does not conduct electricity.

Pyrene is only 14" long and weighs but six pounds—a small child can operate it.

FIRE engineers recommend Pyrene. Large corporations use it. Office buildings are equipped with it. It is in railway and street cars everywhere. Armies and navies depend on it.

Through its use half a million automobilists save 15% on their automobile insurance. It is in thousands of homes. Every day—every hour—it is saving property and lives.

Brass and nickel-plated Pyrene Fire Extinguishers are included in the lists of Approved Fire Appliances issued by the National Board of Fire Underwriters, and are Inspected, Tested, and Approved by, and bear the label of, the Underwriters' Laboratories, Inc.

Pyrene Manufacturing Company

52 Vanderbilt Avenue **New York City**

Branches in 26 cities.

The Pyrene Co. Ltd., 19-21 Great Queens Street, London, W. C.

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Showing Sprinkler with the two halves of the strut soldered together

ROCKWOOD SAFETY LOOP SPRINKLER

Showing how the two parts of the soldered strut spring apart *only after* the lump of solder is *melted* away from the loop

THE Rockwood Sprinkler is unique in that the two parts of the soldered link are held together, not merely by a sweated soldered joint, but by covering the end of the lever with a small piece of solder which is mechanically bound to the strut by a loop of wire riveted through one part of the link.

The Rockwood Sprinkler is the only approved head that is incapable of opening itself by the breaking of the soldered joint, which must absolutely melt to open. It is thus in a class by itself, superior to all others.

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OF MASSACHUSETTS

Manufacturers, engineers, and contractors for complete sprinkler equipments using wet or dry systems.

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THE MAGAZINE OF SAFETY

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SAFETY ENGINEERING

Close view of Eastland showing her exit facility. The door contained the only gangway. Boat's capacity was 2,570 passengers and crew. Hawser shown is the stern line.

PREVENTION OF NEEDLESS WASTE BY FIRES AND ACCIDENTS

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600,000

Pyrene TRADE MARK

Fire Extinguishers

in use

mark the supremacy of the Pyrene Fire Extinguisher as a fire-fighting weapon.

Office buildings are equipped with it. It is in railway and street cars everywhere. Armies and navies use it. Through its use thousands of automobilists save 15 per cent. on their automobile insurance. It brings protection and a feeling of security to countless homes. Every day—every hour—it is saving property and lives.

Inspected and approved by the Underwriters' Laboratories, Inc.

Write for booklet, "The Vital Five Minutes"

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A $100,000 FLY WHEEL WRECK—Caused by Main Belt Breaking

PREVENTION OF NEEDLESS WASTE BY FIRES AND ACCIDENTS

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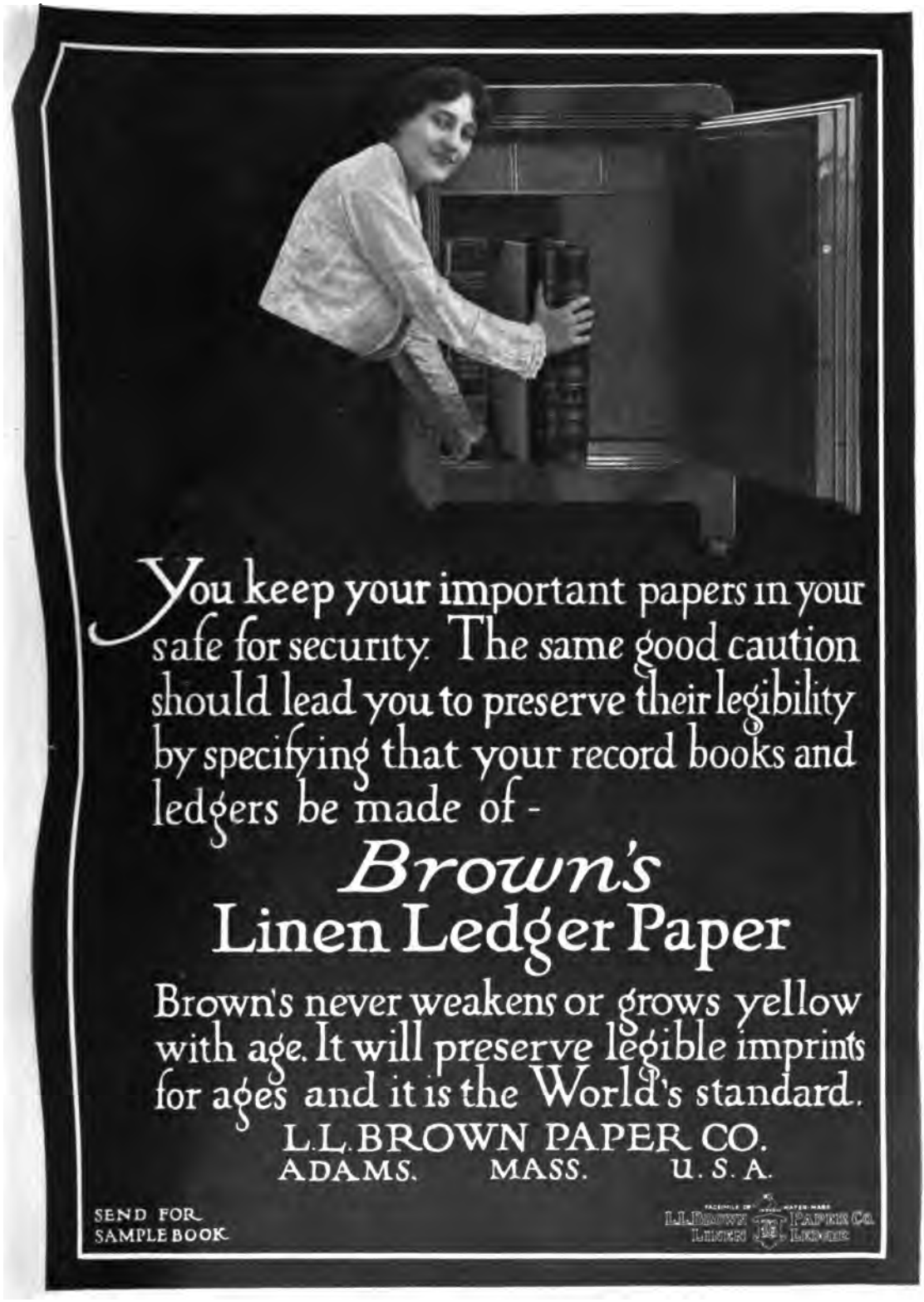
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Primarily the employer buys Workmen's Compensation or Employers' Liability insurance to protect his capital against the destructive drain which industrial injuries entail upon it.

Impelled by motives of personal protection of this kind, insurance buyers are generally particular to ascertain the insurance company's ability to pay its losses, but unfortunately neglect to investigate the character of the inspection service rendered.

Inspection service (to which all policy holders are entitled) is a very important feature of the policy contract.

When it is efficient it does much to eliminate the occurrence of industrial accidents, reduce insurance rates and promote good will between the employees and the employer.

The inspection service of this company is highly efficient. When you contemplate the purchase of workmen's compensation or employers' liability insurance, let us inspect your plant and quote a rate.

It will pay—in complete satisfaction.

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C. Norie-Miller, United States Manager

United States Office

55 John Street **New York**

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"The Chance Taker is the Accident Maker"

If this man—Lucian Simmons is his name—loses the other eye he will be in the dark for life.

Simmons and others were cutting rivets at the American Car & Foundry Company plant. The others wore **SANIGLAS** Eye Protectors. Simmons took a chance. A chip flew—an eye gone!

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Don't do it! Get safe, sure protection with **SANIGLAS.** Cheap goggles are worse than none at all. Write for details to

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What a Prominent Industrial Safety Official Says of Safety Engineering

SAFETY, SANITATION AND RELIEF

INLAND STEEL COMPANY

INDIANA HARBOR, IND November 30th, 1915.

OFFICE OF SAFETY INSPECTOR

Mr. Franklin Webster,
Editor, Safety Engineering,
80 Maiden Lane,
New York, N. Y.

Dear Mr. Webster:--

I wish to congratulate you upon your November, 1915, of Safety Engineering. This issue contains practically enough information to start the average plant in the Safety movement. It is also of great interest and value to the experienced Safety Engineer. Assuring you of the appreciation of the work you are doing, I am

Very truly yours,

Safety Inspector.

JCS-H.

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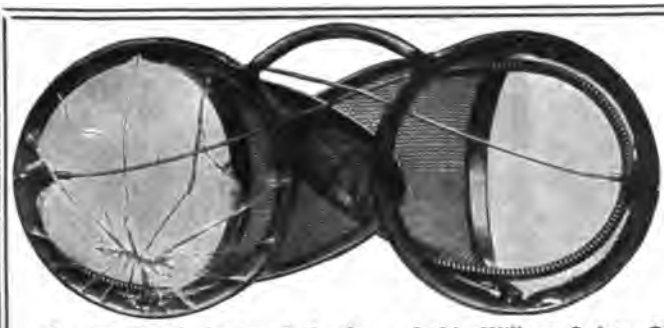

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A rivet head shattered the lens of this Willson Safety Glass. Altho broken into fifteen pieces, the splinters remained fast in the frame. The wearer's eyes were uninjured.

You would have trouble in forcing the pieces back thru the frame towards the eye. Try this with a protection glass without the *Patented Safety Flange.* The lens will collapse like a watch crystal. Does this need any argument?

Willson Safety Glasses have been standardized by the Union Pacific Railroad, Bethlehem Steel Company, Midvale Steel Company and hundreds of others interested in securing practical results. This does not need any argument.

Write today for Special Bulletin describing

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Our best recommendation are the thousands of concerns in the United States that have been using our Automatic Engine Stops and Speed Limit Systems for years. These include small plants, where a serious accident would result in business failure, and some of the largest plants where the economy of safeguarding an industrial organization against shut-downs and suspension of business is appreciated.

THE MONARCH ENGINE STOP AND SPEED LIMIT SYSTEM

The Monarch Engine Stop and Speed Limit System prevents accidents by automatically stopping the engine when it begins to race, when the governor belt breaks or slips, or when any other derangement of governing mechanism occurs. It is Safety First for employes and employer.

Mr. Employer—you can reduce your liability insurance from forty dollars to sixty dollars for every engine by installing the Monarch.

Write for list of manufacturing concerns that have installed our Speed Limit Systems and for illustrated booklet.

CONSOLIDATED ENGINE STOP CO., Inc. **351 W. 38th Street, New York**

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How Did It Happen?

A skilled workman turning from his machine at lunch time, in a factory in Port Huron, Michigan, reached up to throw out the switch controlling his machine and fell dead—killed by a lightning thrust of that invisible force—electricity.

How did it happen—was the switch affected by a high voltage current from the outside, was the man below standard physically, or careless, or what?

What is the cost of such an accident? Home, organization, employer—all pay a part. The cost of safeguarding that open knife switch would have been but a fraction of the expense caused by the accident.

Safeguard the Point of Control

"Square D" Steel Enclosed Switches will prevent accidental contact with live parts. The switch is completely enclosed in a steel box and operates from outside the box by a crank handle. Wherever the point of control (the switch) of an electrical installation is safeguarded by a "Square D" Steel Enclosed Switch, the "human" element, responsible for nearly 75% of all accidents, is reduced to a minimum.

Save Many Times Their Cost

"Square D" Steel Enclosed Switches save their first cost of installation many times because they will lower Workmen's Compensation losses, reduce fire hazards, and regulate factory insurance.

They are officially sanctioned by the highest authorities on fire and accident prevention and bear the new official Fire and Accident Label of the Underwriters' Laboratories and Workmen's Compensation Bureau.

Managements of the smallest factory or the largest corporation can show real profits from the installation of "Square D" Steel Enclosed Switches.

Bulletin 37, giving complete information and prices, should be on the desk of every man interested in industrial fire and accident prevention—send for it today.

WE BELIEVE

that, in addition to enclosing all wiring of electrical installations according to the National Electrical Code, the point of control (the switch) being dangerous to an employee, should be entirely enclosed and operated from outside the enclosing case.

DON'T YOU?

An employee may easily come in accidental contact with the live parts of an open knife switch, and meet serious injury or death. Fire hazards always present.

Interior view of "Square D" Steel Enclosed Switch. Note switch handle on outside of box, making it absolutely safe for employees to operate. Cover can be locked or sealed to prevent tampering.

DETROIT FUSE & MFG. CO., Detroit, Mich.

1410 Rivard Street

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"PIONEER" STEEL HANGERS SECURE SAFETY ABSOLUTE

Patented and Patents Pending

Remember the safe equipment of your plant is just as important as safeguards. Steel shaft hangers are an important requisite in SECURING CONDITIONS OF SAFETY in the operation of your plant. Steel hangers are just as necessary for preventing accidents as are guards and goggles. A steel hanger does not break. A cast iron hanger is liable to break at any time and let fall couplings, pulleys and belts on your employees. No plant can be considered safe where such a danger exists. Progressive manufacturers and those having charge of accident prevention work are installing

UNBREAKABLE "PIONEER" STEEL SHAFT HANGERS

in their plants because they furnish the safest possible hanger conditions. Do not wait until a serious accident convinces you. Equip your plant for 1916 with the "Pioneer" steel unbreakable hanger. Your inquiry will receive our careful and prompt attention.

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THE SECOND ANNUAL

Industrial Safety Exposition of Ohio

(Under the auspices of The Industrial Commission of Ohio)

Will be held in Central Armory, CLEVELAND, OHIO, January 22nd to 29th, 1916

It will be formally opened by HON. FRANK B. WILLIS, Governor of Ohio

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Now he is dead!

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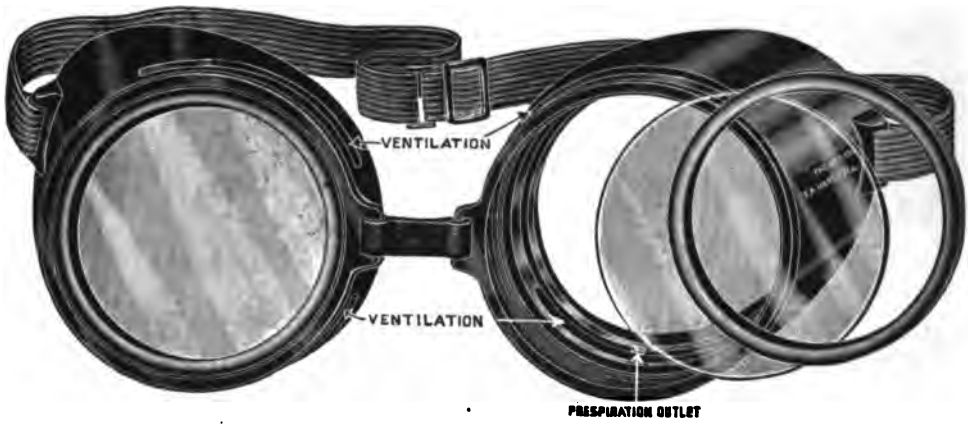

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MONDAY EVENING, NOV. 11, 1872.
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It set *US* thinking and we produced the *remedy*

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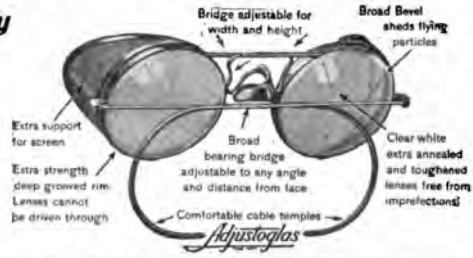
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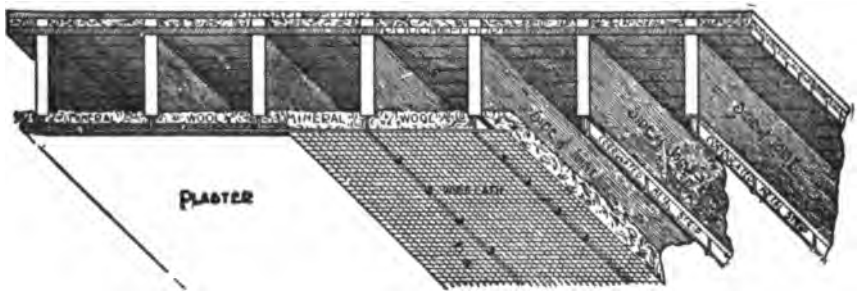

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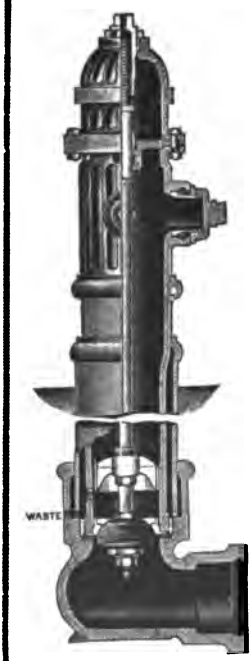

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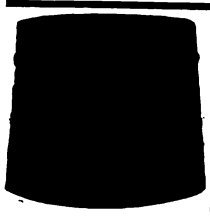

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Equipped with self-closing device insuring positive closing in case of fire.

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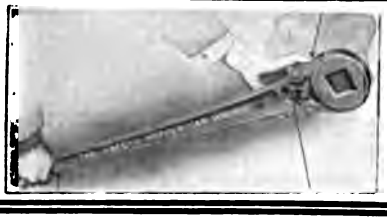

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FIRE PREVENTION ENGINEER.—A vacancy exists in well-known organization for a fire prevention engineer. Preferably technically trained. Experienced, and thoroughly grounded in the underlying principles of fire prevention. Willing to travel part of time. A man of good personal appearance, alert mentality and steady habits. Write fully, No. 1775, SAFETY ENGINEERING.

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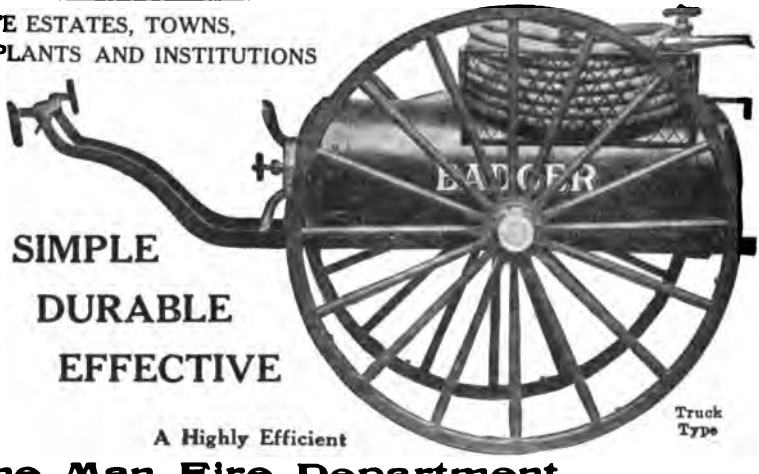

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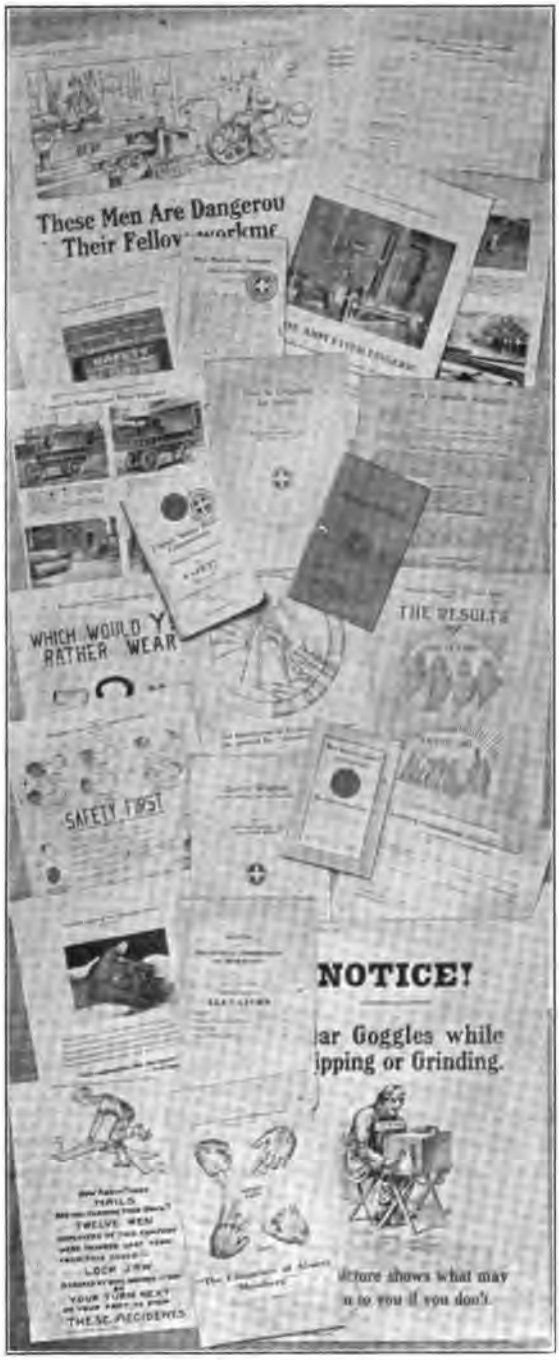
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Solves this problem

Each week's set consists of at least three distinct items which carry messages of CARE direct to your employees—enabling you to cut down that 75% of PREVENTABLE ACCIDENTS.

← This cut shows some of the Bulletins already distributed

During 1914, the National Safety Council distributed 196 distinct items of this nature.

FILL OUT THE COUPON AND MAIL IT

Learn how National Safety Council will help you reduce accidents—get posted on the various other service-features of which the bulletin distributions are only a part.

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To the National Safety Council,
Continental & Commercial Bank Bldg., Chicago, Ill.

Without obligation to $\frac{\text{me}}{\text{us}}$, please send folder relative to your organization—How its service can aid $\frac{\text{me}}{\text{us}}$

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Address .....

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No. of Employees.....

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The compensation policies of The Travelers Insurance Company afford the most complete coverage, satisfying the responsibilities of the insured under the compensation law.

These policies also provide as the result of over twenty years' experience an unequaled service of inspection and safety engineering for the prevention of industrial accidents in plants as diversified as a list of American industrial achievements.

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The prevention of accidents is the most essential factor in reducing the cost of compensation insurance.

The Travelers is the greatest accident and compensation Company in the world.

THE TRAVELERS INSURANCE COMPANY
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Losses Paid in U. S..... 31,000,000

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NEW YORK

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Reserve as a Conflagration Surplus	*2,000,000.00
Cash Capital	*6,000,000.00
All Other Liabilities	16,610,065.11
Net Surplus	10,703,474.16
Surplus as regards Policy-Holders, January, 1915	*18,703,474.00

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Showing Sprinkler with the two halves of the strut soldered together

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Showing how the two parts of the soldered strut spring apart *only after* the lump of solder is *melted* away from the loop

THE Rockwood Sprinkler is unique in that the two parts of the soldered link are held together, not merely by a sweated soldered joint, but by covering the end of the lever with a small piece of solder which is mechanically bound to the strut by a loop of wire riveted through one part of the link.

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